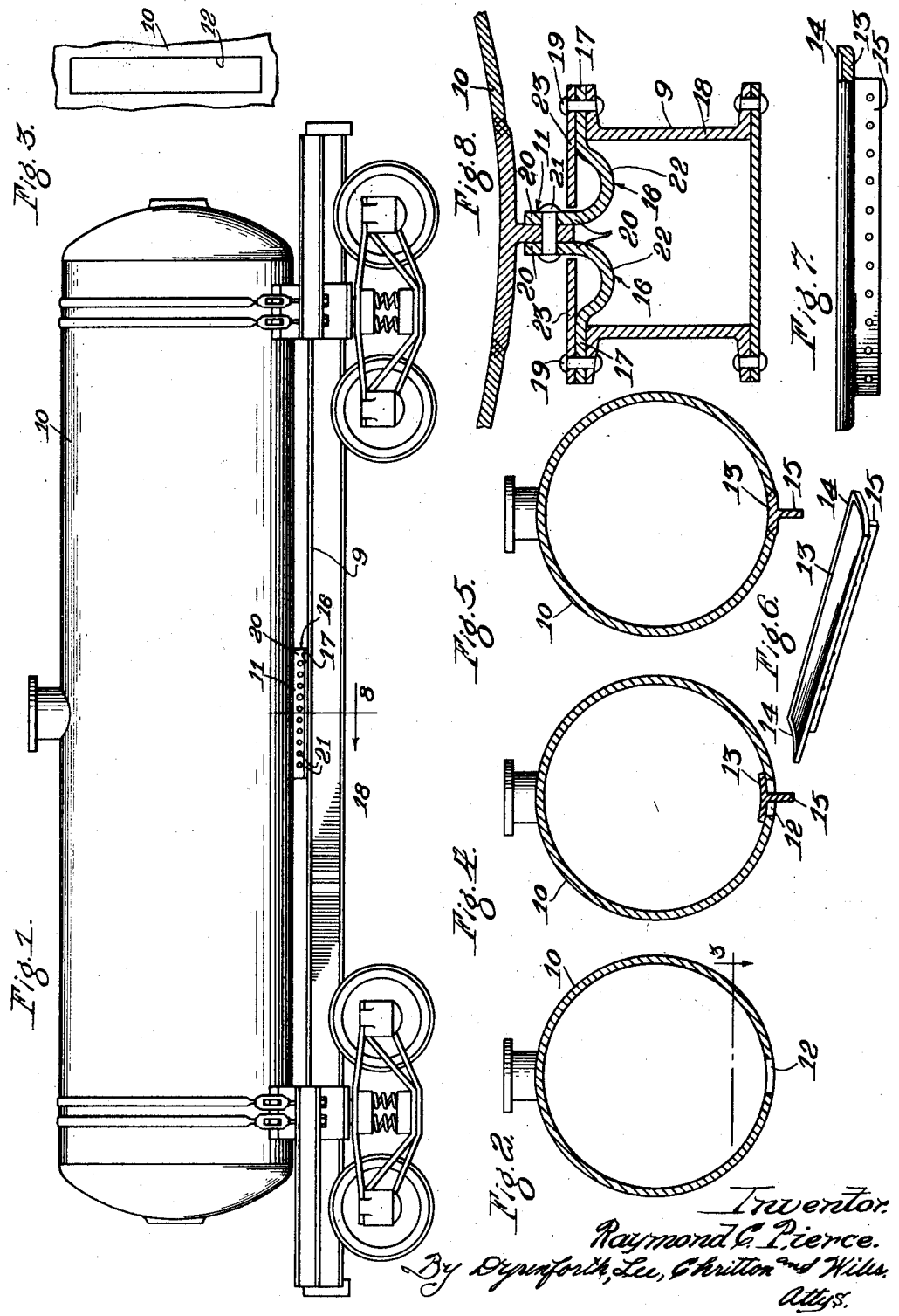
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TANK CAR

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TANK CAR

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My invention relates more particularly to the provision of means for anchoring the tank to the tank car underframe especially in the case of high pressure tank cars, the present application being a division of my pending application for U. S. Letters Patent Serial No. 349,858, filed March 25, 1929.

One of the objects of my invention is to provide anchorage means of such construction as to avoid the possibility of leakage of the contents of the tank at that portion of the anchorage means therefor which is connected with the tank and to avoid the use of rivets for holding such anchorage portion in place, the use of rivets being especially objectionable where the contents of the tanks are such as to produce corrosion of the rivets and requiring, when used, the sealing thereof against contact with the tank contents, by plates covering the rivets and sealed to the tank shell.

Another object is to provide anchorage means which, while maintaining the tank against longitudinal movement of the underframe, will be yieldable under substantially vertical stresses, particularly for the purpose of loosening the strain on the anchorage; and other objects as will be manifest from the following description.

Referring to the accompanying drawings:

Figure 1 is a view in side elevation of a tank car embodying my improved anchorage means.

Figure 2 is a vertical cross sectional view through the middle of the tank of Fig. 1 showing the latter in the process of constructing the anchorage means therefor.

Figure 3 is a plan sectional view taken at the line 3 on Fig. 2 and viewed in the direction of the arrow.

Figure 4 is a view like Fig. 2 and of the construction therein shown, representing a still further step in the process of forming the anchorage means.

Figure 5 is a view like Fig. 4 and of the construction therein shown showing the anchorage means on the tank in finished condition.

Figure 6 is a perspective view of the plate-like tank equipped member which is welded to the shell of the tank to form the anchor element thereof.

Figure 7 is a view in side elevation of the anchor element of Fig. 6; and

Figure 8 is an enlarged broken sectional view taken at the line 8 on Fig. 1 and viewed in the direction of the arrow showing a detail of the anchoring means.

Referring to the particular construction shown, the particular type of car shown in the drawings comprises an underframe structure of the center sill type represented at 9, a tank 10 superposed thereon, and means represented generally at 11 for anchoring the tank substantially midway between its ends to the center sill of the underframe 9, the ends of the tank being supported in a manner, such as is well known in the art, to permit of the longitudinal movement thereof in contracting and expanding. In the manufacture of the car shown I cause the wall of that portion of the tank shown, which in the finished tank construction is the portion thereof at which the anchorage means are located (in the particular construction shown is the central portion of the tank) to contain an opening which in the particular construction shown is located at the bottom of the shell, extends lengthwise of the tank structure and is represented at 12, this opening by preference being of substantially rectangular form.

The anchor forming element for the tank is illustrated in Figs. 6 and 7 this member comprising a platelike portion 13 of a width and length slightly greater than the width and length of the opening 12 in the tank and preferably of slightly greater thickness than the wall of the tank, the portion 13 being preferably of curved shape in cross section with its marginal edges deflected slightly upwardly as represented at 14, the plate 13 having integrally formed therewith a fin or flange 15 extending lengthwise and substantially midway between the sides of the plate portion 14 and short of the ends of the latter, as shown.

In the process of producing the tank anchor the anchor element referred to is positioned in the opening 12 to oppose at the

marginal edges of the plate portion 13 the inner surfaces of the marginal edge portions of the opening 12 with an overlap equal, preferably, to substantially the thickness of the tank shell, substantially as shown, with its fin 15 projecting outwardly through the opening 12 as shown in Fig. 4 in which position it is preferably electrically tack-welded in place to hold it temporarily.

The relatively overlapping portions of the anchor element of Figs. 6 and 7 and the tank are then united by forge-welding them together as by a rolling or hammering action, following the heating to the desired degree of these overlapping portions, the resultant structure being that illustrated in Figs. 5 and 8. The anchorage element referred to thus closes the opening 12 in the shell and becomes firmly united to the metal of the shell for resisting the stresses imposed thereon in service.

As is well known in the metal-working art, it is necessary, as a preliminary to the forge-welding operation usually performed by the rolling or hammering of the parts to be united, that the opposing surfaces of the lapped parts to be united be heated to a temperature closely approaching that of the material of which these parts are formed, such heating of the parts being rendered possible by reason of the lapping of these parts at an opening in the tank shell and the accessibility of these parts to the application of heat thereto both internally and externally of the tank, the deflecting of the plate portion 13 at 14 being desirable as it enhances accessibility of the heat to the joint between the opposing edges of the tank shell and plate portion 13.

The depending fin or flange 15 serves as a means by which the tank may be anchored in place on the underframe.

In the particular construction shown, the fin 15 cooperates with other elements of the anchoring means and connected with the underframe, these other elements comprising plates 16 which are preferably of substantially the same length as the fin 15 these plates having horizontal portions 17 at which they fit flatwise against the upper surfaces of the center sill 18 of the underframe 9 at opposite sides thereof and are secured in place by rivets 19. The inner ends of the plates 16 terminate in upwardly extending substantially vertical portions 20 spaced apart and located at opposite sides of the fin 15 to which latter they are secured as by the rivets 21.

The portions 17 and 20 of the plates 16 are connected together by downwardly bowed portions 22 of these plates.

The plates 16 serve to effectually resist lengthwise movement of the tank relative to the underframe and in addition, by reason of the slight flexibility of the bowed portions 22 of the plates 16, furnish yielding support for the tank permitting of slight vertical relative movement of the tank and underframe and which is of particular importance in lessening stresses upwardly against the tank anchor under impacts to which the underframe is subjected in use.

The construction shown also comprises means resisting deflection of the anchoring means in a direction crosswise of the tank, these means comprising plates 23 held at their outer edges by the rivets 19 and extending inwardly to a position in which their inner edges oppose the vertical portions 20 of the plates 16 thereby forming abutments for resisting lateral deflection of the anchoring means.

While I have shown the depending portion 15 forming an element of the anchorage means as produced by welding a plate of which it is a part at an opening in the bottom of the tank, I do not wish to be understood as intending to limit my invention thereto as the anchoring element of the tank may be provided in other ways.

Furthermore, while the plates 16 are shown and described as formed with the bowed resilient portions 22, it is not necessary, according to one phase of my invention, that they be so formed, as plates secured to the underframe and having upwardly extending portions which are located at opposite sides of a depending portion of the tank and to which they are secured and not having bowed portions may be utilized.

The structure shown may be further modified and altered without departing from the spirit of my invention.

What I claim as new, and desire to secure by Letters Patent, is:

1. In a tank car, the combination with its underframe, of a tank having a depending structure integral therewith, and means for anchoring the tank to the underframe comprising plates secured to said underframe and having upwardly extending portions connected with said depending structure.

2. In a tank car, the combination with its underframe, of a tank having a depending structure integral therewith, and means for anchoring the tank to the underframe comprising plates having horizontal portions and upwardly extending portions, said plates being secured at their horizontal portions to said underframe and connected at their upwardly extending portions with said depending structure.

3. In a tank car, the combination with its underframe, of a tank having a depending structure integral therewith, and means for anchoring the tank to the under-frame comprising plates secured to said underframe and having upwardly extending portions connected with said depending structure, said plates being yieldable under substantially vertical stresses but resisting longitudinal movement of the tank.

4. In a tank car, the combination with its underframe, of a tank having a depending portion integral therewith, and means for anchoring the tank to the underframe comprising plates secured to said underframe and having upwardly extending portions spaced apart and disposed at opposite sides of, and connected with, said depending portion on said tank.

5. In a tank car, the combination with its underframe, of a tank having a depending structure, and means for anchoring the tank to the underframe comprising plates secured to said underframe and have upwardly extending portions lapping said depending structure and connected therewith, said plates being yieldable under substantially vertical stresses but resisting longitudinal movement of the tank.

6. In a tank car, the combination with its underframe, of a tank having a depending portion, and means for anchoring the tank to the underframe comprising plates secured to said underframe and having upwardly extending portions disposed at opposite sides of, and connected with, said depending portion of said tank, said plates being yieldable under substantially vertical stresses but resisting longitudinal movement of the tank.

7. In a tank car, the combination with its underframe, of a tank having a depending structure integral therewith, and means for anchoring the tank to the underframe comprising plates secured to said underframe and having upwardly extending portions connected with said depending structure, said plates having portions thereof so shaped as to restrain the tank against longitudinal movement, but permit flexing of the plates under substantially vertical stresses, for the purpose set forth.

8. In a tank car, the combination with its underframe, of a tank having a depending portion, and means for anchoring the tank to the underframe comprising plates secured to said underframe and disposed at opposite sides of, and connected with, said depending portion, said plates having portions thereof so shaped as to restrain the tank against longitudinal movement, but permit flexing of the plates under substantially vertical stresses, for the purpose set forth.

9. In a tank car, the combination with its underframe, of a tank having a depending structure integral therewith, and means for anchoring the tank to the underframe comprising plates secured to said underframe and having upwardly extending portions connected with said depending structure, said plates having bowed portions flexible under relatively vertical stresses, but preventing longitudinal movement of the tank.

10. In a tank car, the combination with its underframe, of a tank having a depending portion, and means for anchoring the tank to the underframe comprising plates secured to said underframe and disposed at opposite sides of, and connected with, said depending portion, said plates having bowed portions flexible under relatively vertical stresses, but preventing longitudinal movement of the tank.

11. In a tank car, the combination with its underframe, of a tank having a depending portion, and means for anchoring the tank to the underframe comprising plates having substantially horizontal portions at which they are connected with the underframe and substantially vertical portions which are disposed at opposite sides of, and are connected with, said depending portion.

12. In a tank car, the combination with its underframe, of a tank having a depending portion, and means for anchoring the tank to the underframe comprising plates having substantially horizontal portions at which they are connected with the underframe and substantially vertical portions which are disposed at opposite sides of, and are connected with, said depending portion, said plates being yieldable under substantially vertical stresses but resisting longitudinal movement of the tank.

13. In a tank car, the combination with its underframe, of a tank and means for anchoring the tank to the underframe comprising plates having substantially horizontal portions at which the plates are secured to the underframe, substantially vertical portions at which they are secured to the tank and intermediate bowed portions, for the purpose set forth.

14. In a tank car the combination with its underframe, of a tank and means for anchoring the tank to the underframe yieldable under substantially vertical stresses but resisting longitudinal movement of the tank, and means adapted to be engaged by said anchoring means for restraining movement of said tank in a direction crosswise thereof in a horizontal plane.

15. In a tank car, the combination with its underframe, of a tank and means for anchoring the tank to the underframe comprising plates having portions thereof so shaped as to restrain the tank against longitudinal movement, but permit flexing of the plates under substantially vertical stresses, and means adapted to be engaged by said anchoring means for restraining movement of said tank in a direction crosswise thereof in a horizontal plane.

16. In a tank car, the combination with its underframe, of a tank and means for anchoring the tank to the underframe comprising plates having bowed portions flexible under substantially vertical stresses but preventing longitudinal movement of the tank, and means adapted to be engaged by said

anchoring means for restraining movement of said tank in a direction crosswise thereof in a horizontal plane.

17. In a tank car, the combination with its underframe, of a tank and means for anchoring the tank to the underframe comprising plates having substantially horizontal portions at which the plates are secured to the underframe, substantially vertical portions at which they are secured to the tank and intermediate bowed portions, and means adapted to be engaged by said vertical portions of said plates for restraining movement of said tank in a direction crosswise thereof in a horizontal plane.

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