Feb. 26, 1946. H. A. SCHMITZ, JR 2,395,685

STORAGE TANK

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FIG. 1.

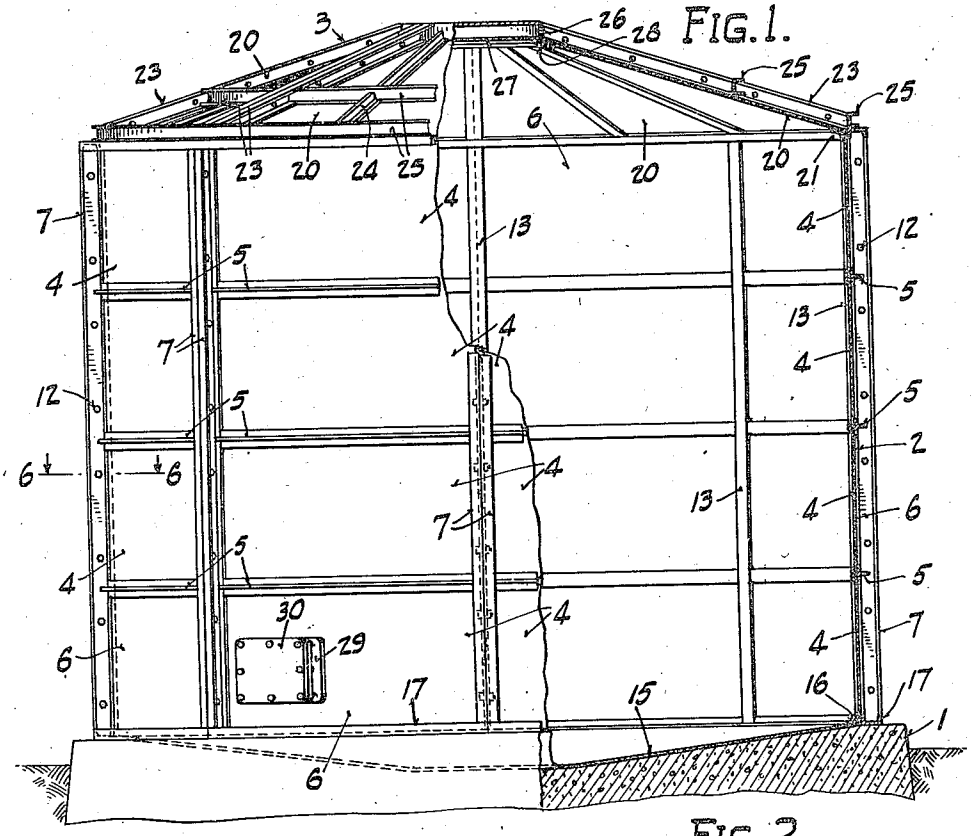

FIG. 2.

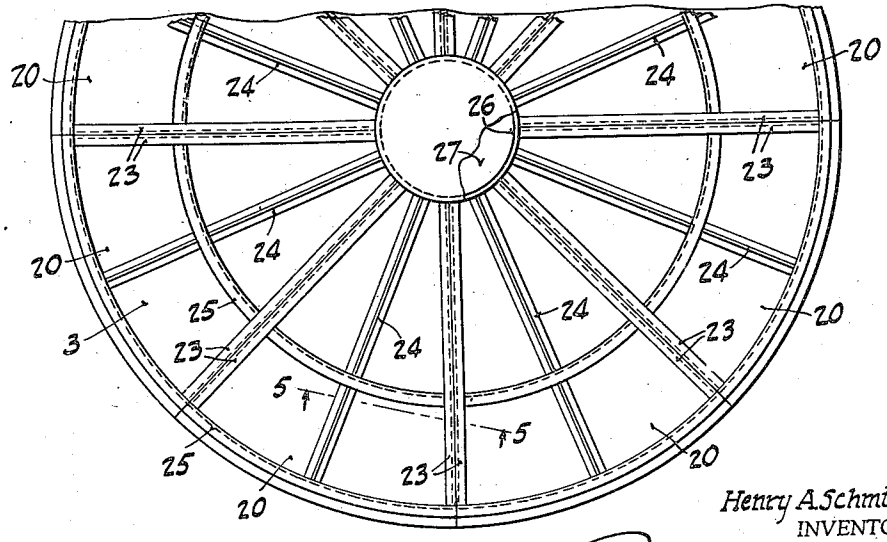

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FIG. 3.

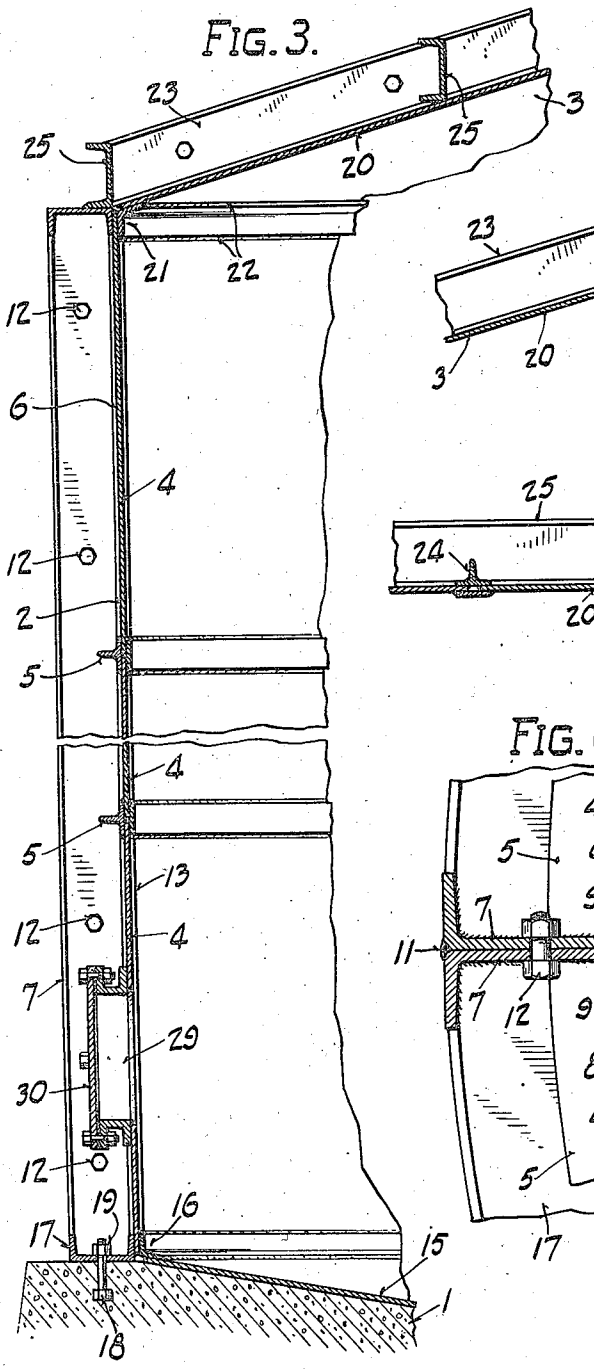


FIG. 4.

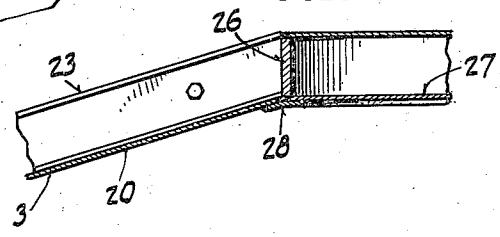


FIG. 5.

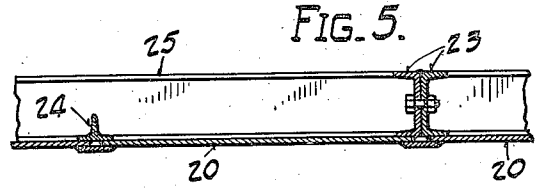
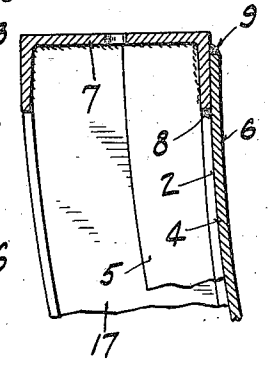


FIG. 6.

FIG. 7.



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2,395,685

STORAGE TANK

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Application June 10, 1943, Serial No. 490,257

5 Claims. (Cl. 220—5)

This invention relates to storage tanks for storing liquids.

One object of the present invention is to provide a storage tank that is constructed from substantially thin plates of corrosion resistant alloy.

Another object is to provide a generally cylindrical storage tank of less costly construction that is simple to erect in the field.

A further object of the invention is to provide a storage tank having substantially thin corrosion resistant alloy plates that are capable of resisting the tensile stress to which the tank is subjected by the contained liquid and having parts giving added rigidity to withstand the pressures exerted by the normal action of the elements.

Other objects of the invention will appear from the following description of an embodiment of the invention illustrated by the accompanying drawings.

In the drawings:

Figure 1 is an elevational view partly in vertical section of a sectional storage tank embodying the invention;

Fig. 2 is a top plan view of the sectional storage tank, a part being broken away;

Fig. 3 is a vertical enlarged sectional view through one of the side plates and a portion of the roof of the tank;

Fig. 4 is a section similar to Fig. 3 of the central portion of the roof;

Fig. 5 is a section taken on line 5—5 of Fig. 2;

Fig. 6 is an enlarged section taken on line 6—6 of Fig. 1 to show the joining of two panels of the side wall; and

Fig. 7 is a transverse section of an edge of a panel as fabricated in the shop.

Referring to the drawings, there is illustrated a structure comprising a base 1, preferably of concrete, on which is mounted the body portion or side wall 2 and roof 3 of a fabricated alloy steel generally cylindrical storage tank.

The body portion 2 is made up of a plurality of generally rectangular curved plates 4 of steel that are fabricated in the factory and there assembled with their long edges secured together by employment of the horizontally disposed T-strips 5 to provide the panel 6 as illustrated in Figs. 1 and 3. The alloy steel employed is preferably corrosion resistant and each panel and plate is designed with a thickness that is sufficient to withstand a predetermined pressure from the contained liquid when the tank is in service as well as pressure from other disturbing forces such as the elements.

The short edge portions of each plate are secured to vertical channels 7 in the manufacturing plant by the outer welds 8 and the inner welds 9. The welds 8 and 9 and the respective channels 7 need not be of corrosion resistant metal as these parts do not come into contact with the contained fluid. The channels serve to give rigidity to the substantially thin plates 4 that form the side wall of the tank and the plates can then effectively resist the pressures exerted by the elements. The depth of the channels may vary with the amount of rigidity desired in the plates.

In assembling the tank in the field the channels 7 of adjoining panels 6 are disposed back to back, and while maintained in this position the channels are secured together by the vertically disposed inner weld 10 and outer weld 11. Similar to welds 8 and 9 the latter welds 10 and 11 need not be made from corrosion resistant metal as the fluid contained in the tank does not circulate to them.

Apertures are provided at predetermined distances through the webs of the channels 7, and the tie bolts 12 are disposed therein to hold the channels of the adjoining panels 6 together during the making of the welds 10 and 11 and to give additional support to the welds when the tank is completed.

The joints between the respective channels 7 are sealed by the butt straps 13. These straps are generally thin in structure and are of a width sufficient to overlap the joint between two adjoining plates. The straps are fabricated from corrosion resistant alloy to prevent their corrosion by the fluid contained in the tank.

The field welds 14 secure the respective edges of the straps 13 to the inner surface of the respective plates 4 engaged by the edges. These welds are also of corrosion resistant metal as they are exposed to the fluid contained in the tank in service.

The concrete base 1 upon which the body portion 2 of the tank is mounted preferably has a greater circumferential extent than that of the body portion 2 and has a concaved upper surface to supply greater space within the tank.

The base 1 is covered with a corrosion resistant metal plate 15 which forms the bottom of the tank. At the juncture of the plate 15 and side wall 2 of the tank, an angular circular ring 16 of similar alloy is welded to each to seal the joint.

The side wall 2 of the tank may be secured to the base 1 by any suitable means. In the factory the lower edge of each panel 6 is provided with a

channel 17. These channels are horizontally disposed and are secured to the lower edges of plates 4 and to the lower ends of channels 7.

In the drawings illustrating the invention, anchor bolts 18 are embedded in the concrete base 1 and are assembled with the channels 17 by passing through suitable holes. Nuts 19 are then threaded onto the threads disposed at the ends of the bolts 18 to secure the base and panels of the side wall together.

The roof 3 of the storage tank comprises a plurality of panels 20 fabricated from corrosion resistant alloy metal similar to that employed in the side wall 2.

The outer ends of the panels 20 engage the upper ends of the plates 4 of the side wall 2 of the tank, and these parts are secured together by means of the arcuate angle members 21 disposed in an overlapping manner at the joint between the roof and side wall. One edge of the angle members 21 is welded to the panels 20, and the other edge is welded to the side wall 2 by the welds 22. The angle members 21 are fabricated from corrosion resistant metal and the metal of the welds 22 are also of similar metal.

The employment of the angle members 21 and the welds 22 between the roof and side wall of the tank as described, seals the joint therebetween in a fluid-tight manner to prevent fluid contained in the tank from escaping and moisture from entering.

To strengthen the roof, channel members 23 are disposed radially on top of the slanting roof and registering at their outer ends with the vertical channels 7 of the side walls. The members 23 serve to secure the panels 20 together similar to the construction of the side wall. Intermediate T-irons 24 may also be applied to the panels at the factory. In addition circumferentially disposed channels 25 are secured at the outer edge of each panel 20 and also at an intermediate radius thereof.

A central ring 26 secures the inner ends of channels 23 together and has a circular flat alloy plate liner 27 welded thereto on the inside. A circular alloy strip 28 overlaps the inner edges of the alloy sheets of panels 20 and the outer edge of the plate 27 and is fillet welded thereto. A top flat cover plate 28 may be welded to the upper edge of ring 26 to add rigidity to the structure and protect plate 27 from injury.

A manhole 29 with a removable alloy cover 30 is provided in one of the side panels for assembly and cleaning purposes. Suitable pipe connections, not shown, are provided to supply fluid to the tank and to withdraw fluid therefrom.

In assembling the sectional storage tank, the base 1 is first constructed and provided with the tank bottom 15 as previously described. The side wall or body portion 2 is then gradually built up by assembling the preformed panels 6 upon the base 1 by employment of the features of the invention. The preformed roof panels are then set into place and secured to each other and to the top of the side wall.

The butt straps 13 and the angle members 16 and 21 are preferably welded over the joints on the inside of the structure after the panels of the tank have been completely assembled. The ring 26 and plates 27 and 28 are also secured to the panels of the roof.

The invention provides a tank structure whose parts are readily transported from the manufacturing plant to the field and there easily assembled. The structure is specially adapted for use as a corrosion resistant retainer for liquids such as HSO_3 and provides a reliable, economically constructed storage tank.

The invention has particular advantages over sectional storage tanks heretofore known in that the employment of the channel members permits the utilization of substantially thin alloy panels. This provides a tank of less costly construction than would be the case where the alloy sheets are of such thickness as to provide the required rigidity. The panels are able to withstand the stress exerted by the liquid contained in the tank in service, and the channels because of their greater depth give the structure sufficient rigidity to resist the stresses to which the tank is subjected by the normal action of the elements.

Various embodiments of the invention may be employed within the scope of the accompanying claims.

I claim:

1. A sectional storage tank of substantially cylindrical shape with a vertical axis and comprising a bottom, a plurality of curved segmental side wall panels of thin metal sheets designed to withstand the internal fluid pressures involved in service and supported on said bottom and extending for substantially the full height of the side walls of the tank, a pair of vertical re-enforcing members at each vertical seam between adjacent panels and having a substantial radial extent to provide rigidity and strength for withstanding external forces, said panel sheets having their aligned edges spaced apart with each edge partially overlapping the inner side of a corresponding re-enforcing member and welded thereto, the adjacent re-enforcing members of each pair meeting back to back and holding the corresponding panel sheet edges spaced apart, and a weld joining said re-enforcing members of each pair together along a vertical line centrally of said space between the corresponding panel sheet edges.

2. A sectional storage tank of substantially cylindrical shape with a vertical axis and comprising a bottom, a plurality of curved segmental side wall panels of thin metal sheets designed to withstand the internal fluid pressures involved in service and supported on said bottom and extending for substantially the full height of the side walls of the tank, a pair of vertical re-enforcing members at each vertical seam between adjacent panels and having a substantial radial extent to provide rigidity and strength for withstanding external forces, said panel sheets having their aligned edges spaced apart with each edge partially overlapping the inner side of a corresponding re-enforcing member and welded thereto, the adjacent re-enforcing members of each pair meeting back to back and holding the corresponding panel sheet edges spaced apart, a weld joining said re-enforcing members of each pair together along a vertical line centrally of said space between the corresponding panel sheet edges, and a vertical strap bridging the space between said panel sheet edges on the inside and welded at its vertical edges to the sheets.

3. A sectional storage tank of substantially cylindrical shape with a vertical axis and comprising a bottom, a plurality of curved segmental side wall panels of thin corrosion resistant alloy metal sheets designed to withstand the internal fluid pressures involved in service and supported on said bottom and extending for substantially the full height of the side walls of the tank, a pair of vertical re-enforcing members at each

vertical seam between adjacent panels and having a substantial radial extent to provide rigidity and strength for withstanding external forces, said panel sheets having their aligned edges spaced apart with each edge partially overlapping the inner side of a corresponding re-enforcing member and welded thereto, the adjacent re-enforcing members of each pair meeting back to back and holding the corresponding panel sheet edges spaced apart, a weld joining said re-enforcing members of each pair together along a vertical line centrally of said space between the corresponding panel sheet edges, and a vertical strip of corrosion resistant allow metal covering the space between said panel sheet edges on the inside and welded at its vertical edges to the sheets.

4. A sectional storage tank of substantially cylindrical shape with a vertical axis and comprising a bottom, a plurality of curved segmental side wall panels of thin metal sheets designed to withstand the internal fluid pressures involved in service and supported on said bottom and extending for substantially the full height of the side walls of the tank, a vertical channel re-enforcing member for each vertical edge of the several panels with the corresponding sheet edge partially overlapping the inner flange and welded thereto and with the back of the channel facing in the direction of the edge of the sheet, said panels being assembled with their adjacent edge re-enforcing channels back to back, and welds joining the backs of corresponding pairs of channel members along vertical lines at both the inner and outer extremities of the same.

5. A sectional storage tank of substantially cylindrical shape with a vertical axis and comprising a bottom, a plurality of curved segmental side wall panels of thin metal sheets designed to withstand the internal fluid pressures involved in service and supported on said bottom and extending for substantially the full height of the side walls of the tank, a vertical channel re-enforcing member for each vertical edge of the several panels with the corresponding sheet edge partially overlapping the inner flange and welded thereto and with the back of the channel facing in the direction of the edge of the sheet, said panels being assembled with their adjacent edge re-enforcing channels back to back, means for initially mechanically securing said adjacent channel members in position for welding, and welds joining the backs of corresponding pairs of channel members along vertical lines at both the inner and outer extremities of the same.

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