April 20, 1954 E. SCHMITZ 2,675,940

REINFORCED TANK STRUCTURE

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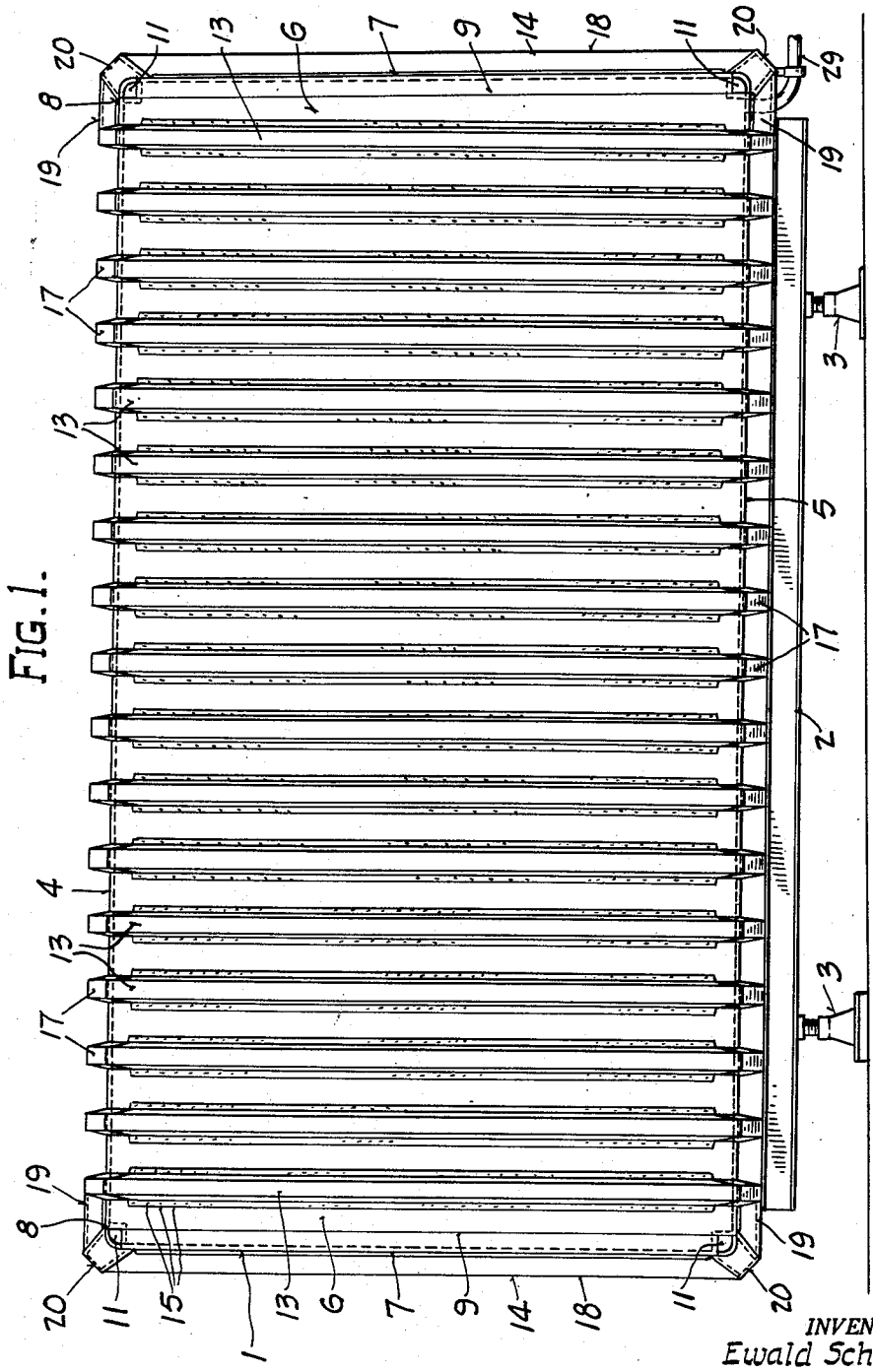


FIG. 1.

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FIG. 2.

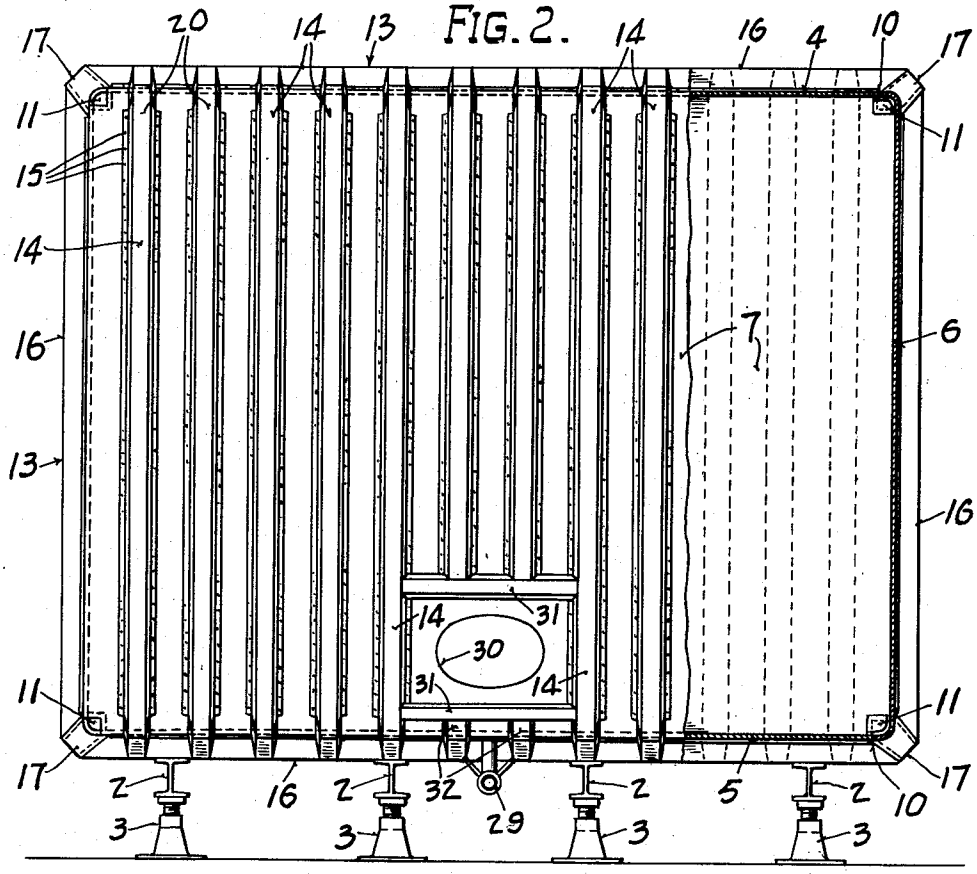
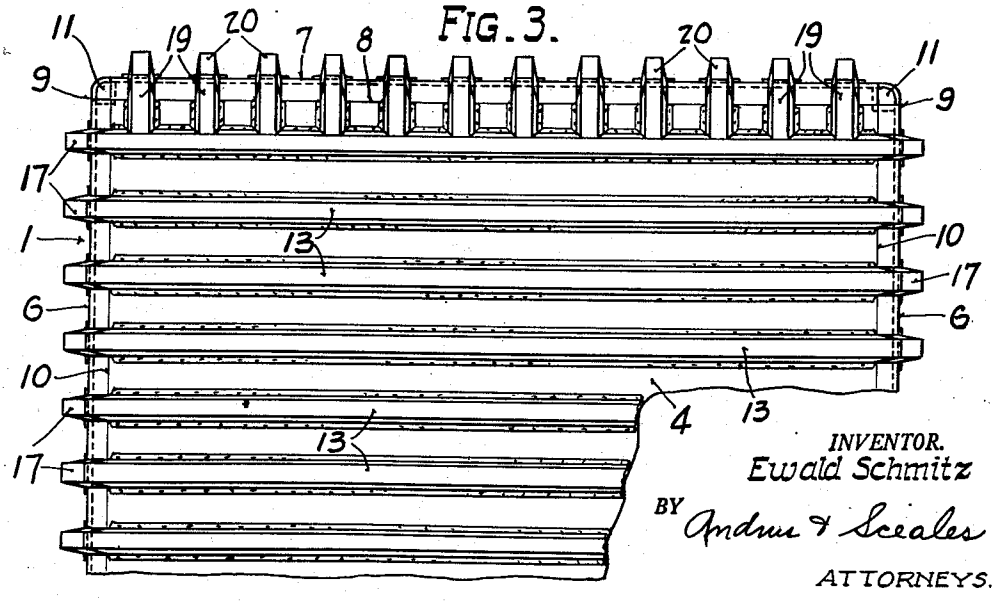


FIG. 3.



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FIG. 4.

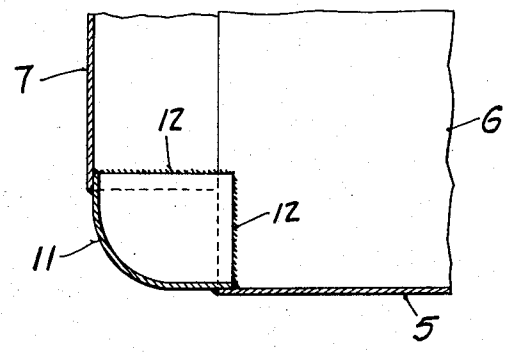


FIG. 5.

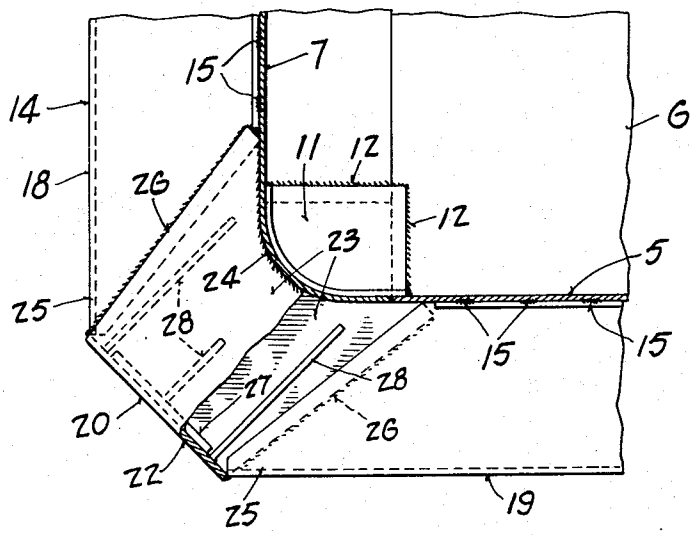
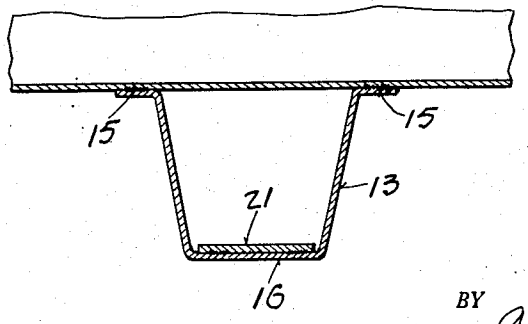


FIG. 6.



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UNITED STATES PATENT OFFICE

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REINFORCED TANK STRUCTURE

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Application July 21, 1951, Serial No. 237,919

3 Claims. (Cl. 220—71)

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This invention relates to storage tanks and more particularly to fermenting tanks for use in the brewing industry.

An object of the present invention is to provide a thin-walled alloy storage tank which is capable of resisting the stress exerted by the contained liquid when the tank is in service.

Another object of the invention is to provide a convenient and less costly method of structural reinforcement for a thin-walled storage tank.

Still another object is to provide a storage tank which will resist corrosion and at the same time will not destroy the flavor or appearance of the contained liquid.

Another object is to provide an attractive appearing storage tank which may be easily cleaned and maintained.

Breweries require a fermenting tank which may be cleaned easily and which will be resistant to corrosion and contamination. The presence of impurities or an oxidizable tank surface is apt to alter the flavor or appearance of the contained liquid and hence render it useless as a commercial product. Therefore, it is essential that the tank be constructed of, or lined with, a non-oxidizing corrosion-resistant material.

Under the present invention, the tanks are constructed of thin stainless steel plates which prevent contamination of the contained liquid and are easily cleaned, and require virtually no maintenance. In addition, the stainless steel tank presents a neat, attractive appearance which is advantageous in the brewing industry, for the breweries generally are open to the public.

The generally rectangular stainless steel tank of the invention is encompassed by a plurality of spaced reinforcing ribs. These ribs are formed of flanged straight sections, which extend over the side walls and bottom and top of the tank and which are joined together at the longitudinal corners of the tank by curved edge pieces. The thin wall of the tank is thus strengthened by a plurality of ribs which extend completely around the tank. Similar ribs extend across the front and rear of the tank and are welded to the foremost and rearmost ribs that extend around the tank. Again the curved edge pieces are employed over the transverse corners of the tank to form a plurality of single rib members tied into the transversely extending ribs. The edge pieces permit easy welding and assembly of the ribs and effect decrease in cost in forming the rib structure, since the major portion of the flanged rib structure is readily made in straight section in a simple die operation.

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Other objects and advantages of the invention will appear from the following description of the embodiments of the invention illustrated by the accompanying drawings.

In the drawings:

Figure 1 is a side elevation of a storage tank embodying the invention;

Fig. 2 is an end elevation of the tank, partly in section;

Fig. 3 is a top plan view of the tank with a part broken away;

Fig. 4 is a fragmentary sectional view showing a corner of the container;

Fig. 5 is an enlarged fragmentary section of the lower left hand portion of the container shown in Figure 1 with parts broken away; and,

Fig. 6 is a transverse section through a rib and a part of the tank wall.

Referring to the drawings, there is shown an embodiment of the present invention comprising a closed tank 1 of a generally rectangular shape mounted on a base consisting of a plurality of I-beams 2 which rest on several adjustable supports 3. By varying the height of supports 3, tank 1 may be given a desired pitch or slope to facilitate drainage.

Tank 1 is formed of the top panel 4, the bottom panel 5 and the side panels 6 and end panels 7. These panels are of corrosion-resistant material, such as stainless steel, which is held to a minimum of thickness due to the reinforcement of the panels of tank 1 under the invention, against the pressure of contained fluid.

End panels 7 are notched at the corners when they are fabricated, so that the four edges may be formed inwardly. The end panels are welded to top and bottom panels 4 and 5 along the transverse seams 8 and to the respective side panels 6 along the vertical seams 9 at substantially the four vertical corners of tank 1.

The side panels 6 are formed or curved inwardly at the top and bottom and welded to the top and bottom panels 4 and 5, respectively, along the longitudinal seams 10 at substantially the four longitudinal corners of the tank.

The openings at the four corners of the tank, due to the notching of panels 7 to form their curved edge portions, are closed by the cap plates 11, as shown in Figs. 4 and 5, which are welded at 12 to the respective panels they engage at the particular corner of the tank where the plates 11 are located.

The panels forming the walls of tank 1 are reinforced by the laterally spaced, flanged and channeled reinforcing ribs 13, with each rib en-

circling the tank to form a rigid supporting brace that extends completely around the tank wall. Similar ribs 14 extend vertically on the head panels 7 and over the front and rear corners of the tank into engagement with the outermost rib 13 at both the top and bottom of the front and rear of the tank. Ribs 14 are welded to ribs 13 at their line of engagement to integrally join ribs 14 to the outermost transverse ribs 13.

Ribs 13 and 14 are preferably constructed of the same alloy as the tank panels for improved welding, since the flanges of ribs 13 and 14 are secured to the panels of the tank by spot welds 15.

Each rib 13 comprises a straight rib section 16 for each panel of the tank encompassed and edge pieces 17, which join the sections 16 together along the longitudinal edges of the tank.

Each rib 14 also has a straight rib section 18 that extends across a respective head panel 7, and a short rib section 19 extending across either the top or bottom panel of the tank, as the case may be, and welded to the outermost transverse rib 13. Sections 18 and 19 are joined together by the edge pieces 20 along the front and rear edges of the tank.

A thin reinforcing plate 21, as shown in Fig. 6, may be welded to the web of either rib sections 16 and 18 on the inside to reinforce the rib. The illustration shows such a plate welded to the web of rib section 16.

Edge pieces 17 and 20 are the same in construction, and, therefore, it is only necessary to describe one of them and the manner of securing the edge piece in place, as shown in Fig. 5. Thus the edge piece 20, for example, is similar in cross section to the rib sections 14, which it joins, except that the edge piece does not have any flanges at the sides.

In general, edge piece 20 is of channel shape with a web 22 from each side of which extends the side plates 23. The side plates 23 widen out in their extent from web 22, and their ends are concave to substantially conform to the curvature of the edge of the tank wall over which the edge piece 20 lies. The concave end of each plate 23 is joined directly to the wall of the tank by weld 24.

The terminal end 25 of each of the rib sections which are joined by edge 20 (in this case, as illustrated in Fig. 5, this would be rib sections 18 and 19 which with edge 20 make up rib 14) extend diagonally of the rib slightly in advance of the flanges of each section which are joined by spot welds 15 to the side panel 7 and bottom panel 5, respectively. The web 22 of the edge piece rests on the outer edge of each terminal 25 of the rib sections, and the plates 23 overlap the side walls of the rib sections 14 for a substantial distance. The plates 23 are joined to the side walls of rib sections 14 by welds 26. The edge piece 20 is thus joined to the tank wall and to the ribs 14 to completely form the integral brace or rib 14 around the end walls of the tank.

To reinforce each edge piece 20, a strip 27 is welded flatwise to the inside of web 22. Additional strips 28 are edge-welded to the side plates 23 and web 22.

As shown in Fig. 2, the joining of the rib sections 16 by the edge pieces 17 forms the integral bands 13 which encircle the tank and are welded thereto.

A drain connection 29 is secured to the bottom panel of the tank, and other suitable piping connections, not shown, are of course provided.

For access to the inside of the tank, a central manhole 30 with a removable cover is provided near the lower end of head panel 7. The manhole is bordered on the sides by rib 14 and at the top and bottom by short horizontal ribs 31. Each edge piece 20 at the manhole location is welded to a short filler rib 32, which in turn is welded to the lowermost horizontal rib 31. The ribs 14 above the manhole are welded to the uppermost horizontal rib 31. The ends of ribs 31 are each welded to the vertical ribs 14 that extend on each side of the manhole.

Under one method of assembling the tank or container of the invention, after the rib sections 16 and 18 have been formed and reinforced by plates 21, the flanges of these rib straight sections are welded in lateral relation to adjoining ribs to the panel to which they are to be applied. Short rib sections 19 on the top and bottom panels in the front and rear are also welded to the outermost straight section 16 of the rib 13 and spotted to the top panel 4 and bottom panel 5.

The panels 6 are then formed inwardly at the top and bottom. The end panels are similarly formed on all four edges, having been notched at the corners to permit this operation. The panels 4, 5, 6 and 7 are then welded together along their adjoining seams, and cap plates 11 are welded into the corners of the tanks.

Thereafter, after proper forming and reinforcing, as described, the respective edge or corner pieces 17 and 20 are welded to the tank wall and their respective rib sections to complete a plurality of laterally spaced stiffening braces transverse around the tank wall and to brace the front and rear end panels.

The invention provides a tank that will withstand considerable pressure, although of a substantially thin alloy wall which holds requirement of the alloy metal to a minimum. The edge piece construction requires only a simple welding operation to join the rib bracing structure together and gives the tank a sightly appearance.

Various embodiments may be employed within the scope of the following claims.

I claim:

1. A bracing structure for a tank wall wherein a thin alloy panel of one wall of a tank is curved at one end at generally right angles toward the edge of a panel of another wall of the tank to form a curved corner portion on the tank, a weld joining the panels together, a straight, hollow, flanged rib having the flanges thereof welded to the one panel and stopping short of said corner portion with the end of said rib adjacent said corner portion being beveled, a second, straight, hollow, flanged rib having the flanges thereof welded to the other panel and disposed in alignment with the first-named rib, said second rib stopping short of said corner portion with the end of said second rib adjacent said corner portion being beveled, a hollow edge piece disposed between the hollow members and having a web portion and side plates joined to opposite sides of said web portion with each plate being cut out at the free inner end to conform to the curved corner portion of the tank wall and the side edges of said edge piece complementing the beveled ends of the ribs, and welds joining the edges of the edge piece to the panels over the corner portion encompassed and to the ribs on opposite sides of said edge piece to integrally join the ribs and brace the panels in service.

2. A bracing structure for tank wall wherein a thin alloy panel of one wall of a tank is curved at one end at generally right angles toward the

edge of a panel of another wall of the tank to form a curved corner portion on the tank, a weld joining the panels together, a straight, hollow, rib welded to the one panel and stopping short of said corner portion with the end of said rib adjacent said corner portion being beveled and converging toward the plane bisecting said corner portion at a position outward of the corner portion, a second, straight, hollow, rib welded to the other panel in alignment with the first-named rib and stopping short of said corner portion with the end of said second rib adjacent said corner portion being beveled and converging toward the plane bisecting the corner portion at a position outward of said corner portion, a hollow edge piece disposed between the hollow members, said edge piece having a web portion and side plates joined to opposite sides of said web portion with the side edges of the side plates being formed complementary to the respective beveled end edges of the ribs and overlapping the same a slight distance, and said plates being cut out at the free inner ends to conform to the curved corner portion of the tank wall, welds joining the edges of the edge piece to the panels over the corner portion encompassed and to the ribs on opposite sides of said edge piece to integrally join the ribs and brace the panels in service, and bracing plate means welded inside the edge piece to strengthen the same.

3. A generally rectangular container which comprises a plurality of substantially thin metal panels welded together at their adjoining edges to provide a closed container having side and end walls and top and bottom walls, and with the edge portions of a member of said panels being curved toward an adjacent panel to provide said container with curved corner portions, a plurality of spaced hollow rib members having a

generally trapezoidal configuration in cross section and secured to the outer surface of the side walls and similar rib members secured to the outer surfaces of the top and bottom walls in alignment with the first-named rib members, the ends of each of said rib members being beveled and spaced from the beveled end of the adjacent aligned rib member, edge pieces disposed over the curved corner portions of the container and attached between a pair of aligned rib members, said edge pieces being provided with an outer web portion extending on a flat plane and side walls extending inwardly from the web portion with the free inner edge of each side wall shaped in conformity with the curvature of the corner portion of the container, the side edges of the walls of said edge pieces being beveled to complement and overlap the beveled ends of the corresponding rib members, and welds joining the edges of the side plates of each edge piece to the respective corner portion of the container and to the respective rib members to provide a plurality of continuous integral ribs extending around the periphery of the container.

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