

April 13, 1943.

W. J. SIMONDS

2,316,296

TANK CONSTRUCTION

Filed June 1, 1940

2 Sheets-Sheet 1

Fig. 1.

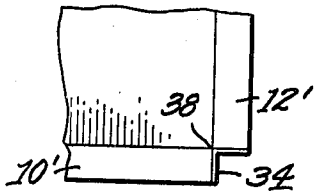
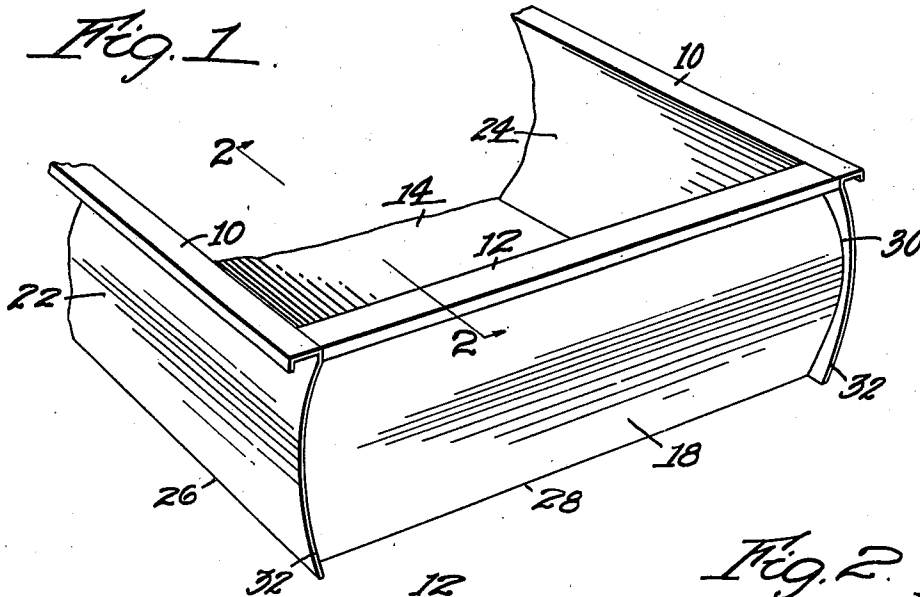


Fig. 4.

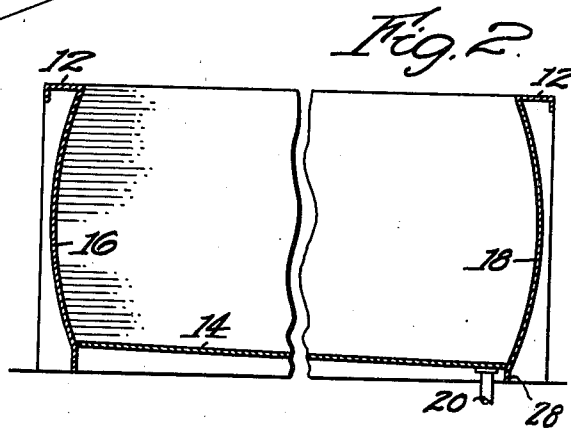
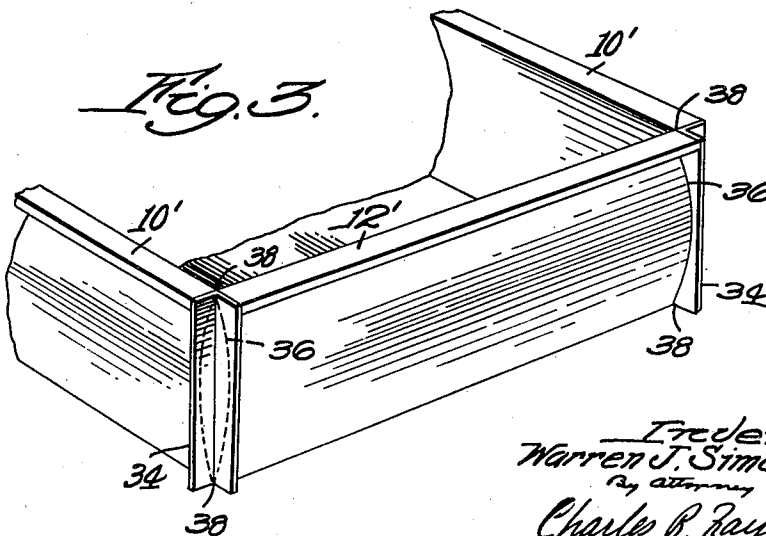


Fig. 2.

Fig. 3.



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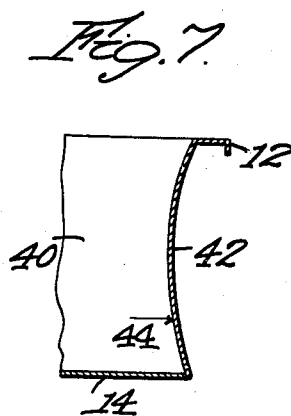
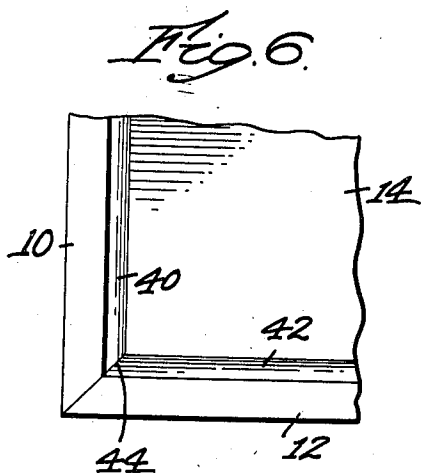
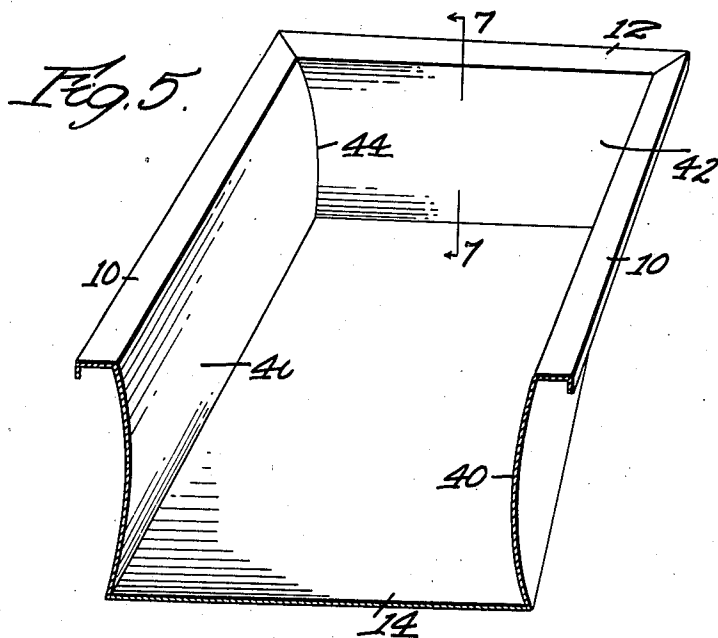
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TANK CONSTRUCTION

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,316,296

TANK CONSTRUCTION

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Application June 1, 1940, Serial No. 338,291

2 Claims. (Cl. 220—72)

This invention relates to tanks or tubs to be used particularly, but not necessarily, in the textile industry, as dye kettles or vats for containing water, dyes, bleaching solutions, or other liquors, either hot or cold. The present construction is useful in any relation where liquors are to be poured into and emptied out of the tank repeatedly. This application presents a distinct improvement over, but is directed to the same general subject matter of my Patent No. 1,948,137, dated February 20, 1934.

The principal objects of this invention include the provision of a tank for the purposes above described, in which the walls are made of thin metal, with connecting means between walls which will retain the shape of the walls despite continued filling and emptying of the tank, thus avoiding flexure and consequent fatigue of the thin walls, and preventing breakage and weakening of the material; the provision of such a tank in which the necessity for using cast iron and steel reinforcements and ribs is avoided; the provision of a greatly simplified tank construction using thin metal sheets with consequent lessening of manufacturing expense, in which the corner connections provide the required rigidity of the side walls, and thus all strengthening ribs, etc., heretofore thought to be necessary, can be omitted, with no loss in length of wear, convenience, or efficiency.

Other objects and advantages of the invention will appear hereinafter.

Reference is to be had to the accompanying drawings, in which

Fig. 1 is a perspective view of a tank embodying the present invention, with parts broken away;

Fig. 2 is a section on line 2—2 of Fig. 1;

Fig. 3 is a view similar to Fig. 1, but showing a modified form of the invention;

Fig. 4 is a plan view of a corner construction of the tank shown in Fig. 3;

Fig. 5 is a perspective view of a modified tank construction;

Fig. 6 is a plan view of a corner of the tank of Fig. 5; and

Fig. 7 is a section on line 7—7 of Fig. 5.

The advantages and disadvantages of using thin sectioned stainless metals in tanks of the present type have been explained in my prior patent above identified. Briefly, steel and iron will quickly rust in dye and bleaching vats, but stainless metals are too expensive to use in old constructions, and the gauge of the walls has therefore been reduced. This results in flexing

outwards of straight walls when filling, and consequent return to flat condition when emptying, this in turn resulting in fatigue and fracture of the metal. My prior patent discloses a tank having set bulged walls and rib reinforcements to prevent flexing while still using thin metal walls, and that invention in large degree solved the problem. However, I have now improved upon that structure and have discovered a way to avoid the use of the ribs, and thus lessen time and expense in manufacture, while still retaining the advantages of my prior construction, and retaining the tank walls in their preformed, curved shape.

In the drawings, Figs. 1 and 2 show a tank or vat of generally rectangular construction, and formed of thin sheets of an acid or alkali resisting metal, such as stainless steel, monel metal, etc., or any material suitable for the purpose. All the parts are permanently welded to form a permanent tank or vat, suitable for dyeing, bleaching, and other purposes. Before assembly, the sheets of material forming the sides, front, and rear are turned out to form flanges 10, 12 for resistance to bending transversely, these flanges acting in the same manner as the flanges of an I-beam, and since flanges 10, 12 are all welded together in a single plane, they provide a rigid box-like frame. The bottom 14 may be arranged to slope down from rear wall 16 towards front wall 18, to drain the tank as by a pipe 20.

The side walls 22, 24 are similar, and each comprises a relatively long sheet of stainless material which is preformed by longitudinal bending into the transversely curved shape as shown, the edges 26 opposite from the flanges 10, 12 forming supporting legs for the tank. These legs may, if desired, retain their original flat form to provide vertical supports, in that area which is below the bottom 14, as the liquors in the tank do not affect this area. Except for this, however, any transverse cross-section of either side 22, 24 will show substantially the same curved outline. The extent of the curve to which the walls are bent depends on the depth of the tank, as this determines the pressure on the walls.

The front 18 is also preformed by a longitudinal bend which produces the transverse curve shown, and its edge 28 opposite from the flange 12 may be straight to form a supporting leg. The rear wall 16 is similar and has the same bulged or curved form. In the form of the invention shown in Figs. 1 and 2, the sides 22, 24 may be longer than the front and rear, and over-

lap the ends of the same, and the ends of the front and rear walls are cut on a compound curve just fitting the bulge or curve of the sides as at 30. When in place, the ends of the front and rear walls are welded to the sides just within the ends thereof. This produces the tank shown in Fig. 1, but of course the dimensions may be varied.

It will be noted that when the four sides are welded together, the curved ends 30 of the front and rear walls will act as members to maintain the curve of the sides, and the preformed curve of the front and rear walls. Also, the extending portions 32 of the sides form a continuation, in part, of the flanges 10, 12, and thus rigidify the tank top as a frame and these flanges 10, 12 prevent any transverse bending in the walls. Hence, due to the preformation of the walls and the novel corner interconnections thereof, the present tank will not bulge further upon filling, nor collapse inwardly upon emptying, and yet no supporting or reinforcing ribs or extraneous castings or framework are needed, as has heretofore been thought necessary.

The modification as shown in Figs. 3 and 4 obtains the same result but with a different corner construction. In this case, the walls all have similar flanges, as 10', 12', and are curved to the same degree as described above. However, the ends of the walls are cut off square, and angle irons 34 of stainless material are welded on their outside surfaces to the cut ends. This forms curved welded connections 36, and it will be seen that the apex of each angle 34 extends into the tank. At the tops and bottoms of the tank, the ends of the walls just meet, as at 38. In effect, the angles 34 form continuations of flanges 10', 12'.

Another modification is shown in Figs. 5-7, in which the walls are preformed to curve inwardly, and thus both a side wall 40 and a front or rear wall 42 are joined together on a compound curve, since the preformed curved walls must be cut on an end curve reverse to that shown at 30, and illustrated at 44, so as to join and mutually maintain the next adjoining wall curves. It is contemplated that any type of corner joint illustrated may be utilized for either an outwardly or inwardly bulged construction, and other corner joints than those illustrated might also be used.

It is pointed out that a flat wall will flex under liquid pressure load, but that either the inwardly or outwardly bulged walls will resist such bending, due to the components of force set up in the walls and flanges, and as the corner constructions will maintain the curves, no further reinforcements are found necessary to prevent the deleterious flexing of the thin side walls.

It will be seen from the above that there will be no bending or flexing of the walls by the introduction of liquids into the tank, and consequently there is no tendency to collapse inwardly when the liquids are drained, and therefore no fatigue or fracture can result.

In this way a tank, vat or kettle is provided, which is devoid of the difficulty due to the fatiguing of the metal, which has been present with

these articles since it became necessary to make them of very thin stainless metal. The life of the article is greatly increased, the steel or iron strengthening frameworks or ribs are entirely avoided, the article is of light weight and yet strong and durable and it contains no parts made of metals easily attacked by the acids and the other liquids which are adapted to be used in these containers.

Although I have illustrated and described only a few forms of the invention, I am aware of the fact that further modifications might be made therein by any person skilled in the art without departing from the scope of the invention as expressed in the claims. Therefore, I do not wish to be limited in this respect otherwise than as set forth in the claims, but what I do claim is:

1. As an article of manufacture, a tank having a bottom, side walls, and an open top, said tank being adapted for the reception and emptying of fluids, said side walls being composed of flexible sheet metal which is thin enough to normally flex under liquid loads in the tank, and means to prevent such flexing, said means comprising pre-set bulges in said side walls, said bulges being substantially uniform throughout the lengths of the walls from end to end thereof and extending outwardly, said walls being joined at their ends to form vertically curved corners, an outwardly extending flat rim having down turned edges at the top of each wall, said rims being joined at the corners and extending outwardly of the tank from the top of each corner, the bulges in the side walls being maintained in set condition under liquid loads by their corners and by said rims, the latter acting as I-beams to prevent buckling of the side walls on vertical lines, certain of said side walls terminating in at least one edge lying substantially in a vertical plane, said plane being at a right angle to the respective side wall.

2. As an article of manufacture, a tank having a bottom, side walls, and an open top, said tank being adapted for the reception and emptying of fluids, said side walls being composed of flexible sheet metal which is thin enough to normally flex under liquid loads in the tank, and means to prevent such flexing, said means comprising pre-set bulges in said side walls, said bulges being substantially uniform throughout the lengths of the walls from end to end thereof, said walls being joined at their ends to form vertically curved corners, an outwardly extending flat rim having down turned edges at the top of each wall, said rims being joined at the corners and extending outwardly of the tank from the top of each corner, the bulges in the side walls being maintained in set condition under liquid loads by their corners and by said rims, the latter acting as I-beams to prevent buckling of the side walls on vertical lines, certain of said side walls terminating in at least one edge lying substantially in a vertical plane at right angles to the respective side wall.

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