

June 28, 1932.

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1,864,931

TANK CONSTRUCTION

Filed March 13, 1930

4 Sheets-Sheet 2

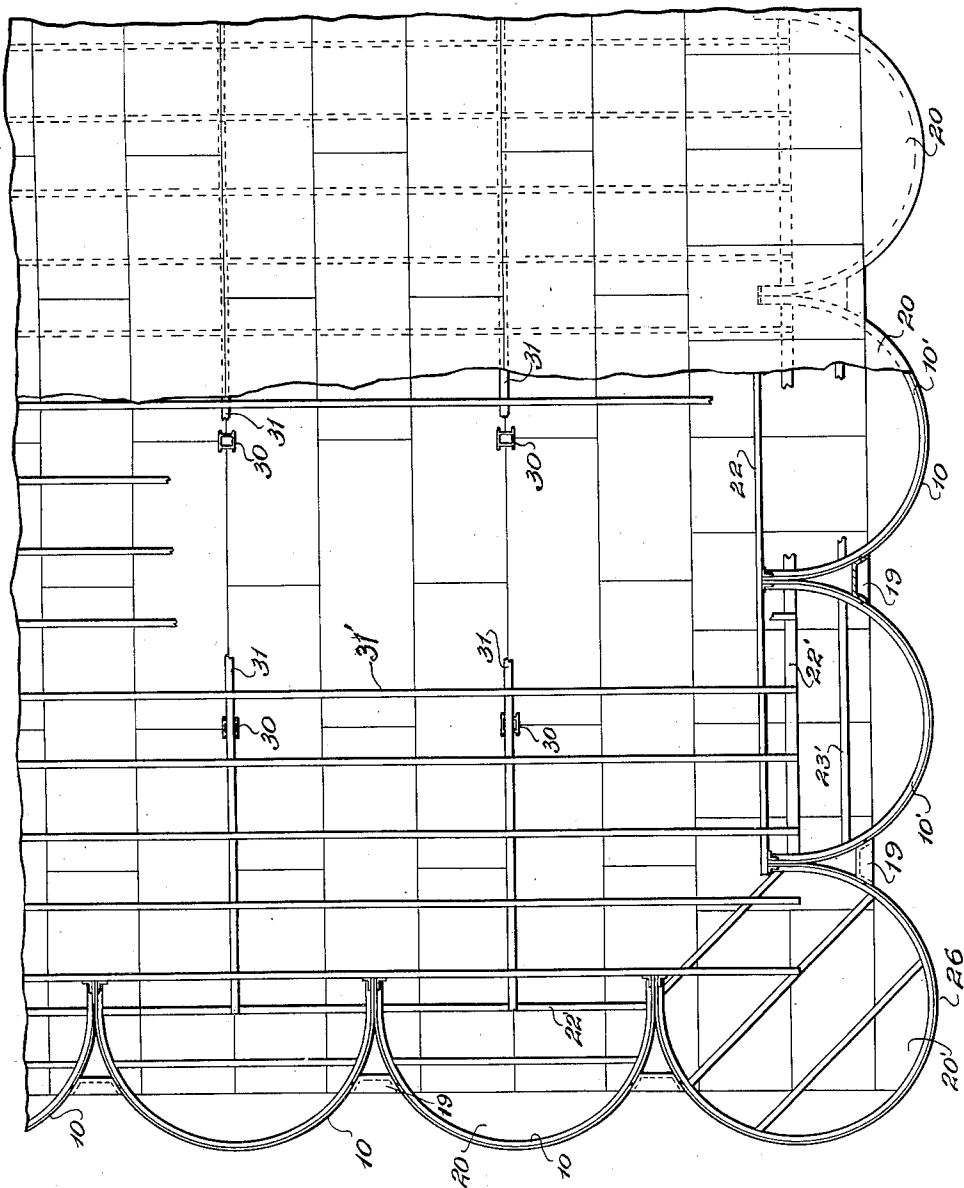


FIG. 3-

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FIG. 4.

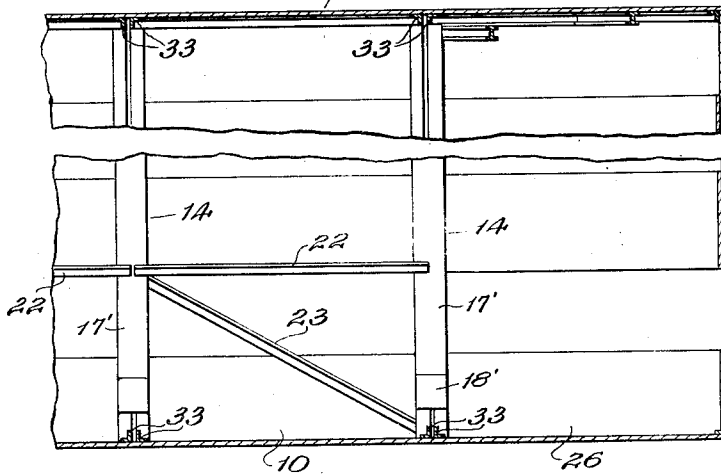


FIG. 5.

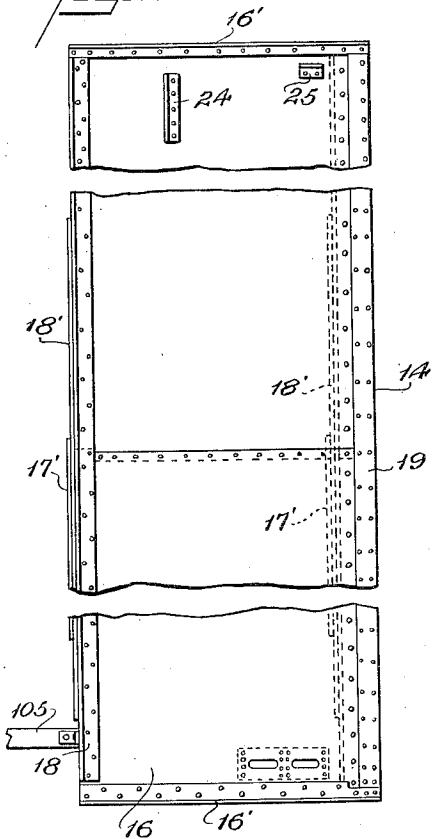


FIG. 6.

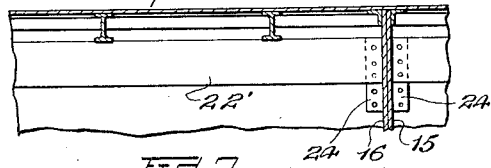


FIG. 7.

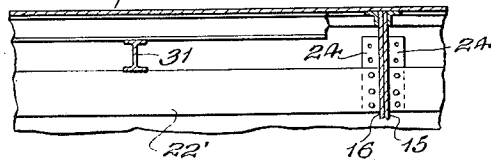
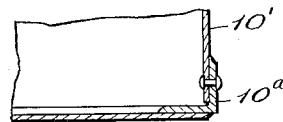


FIG. 8.



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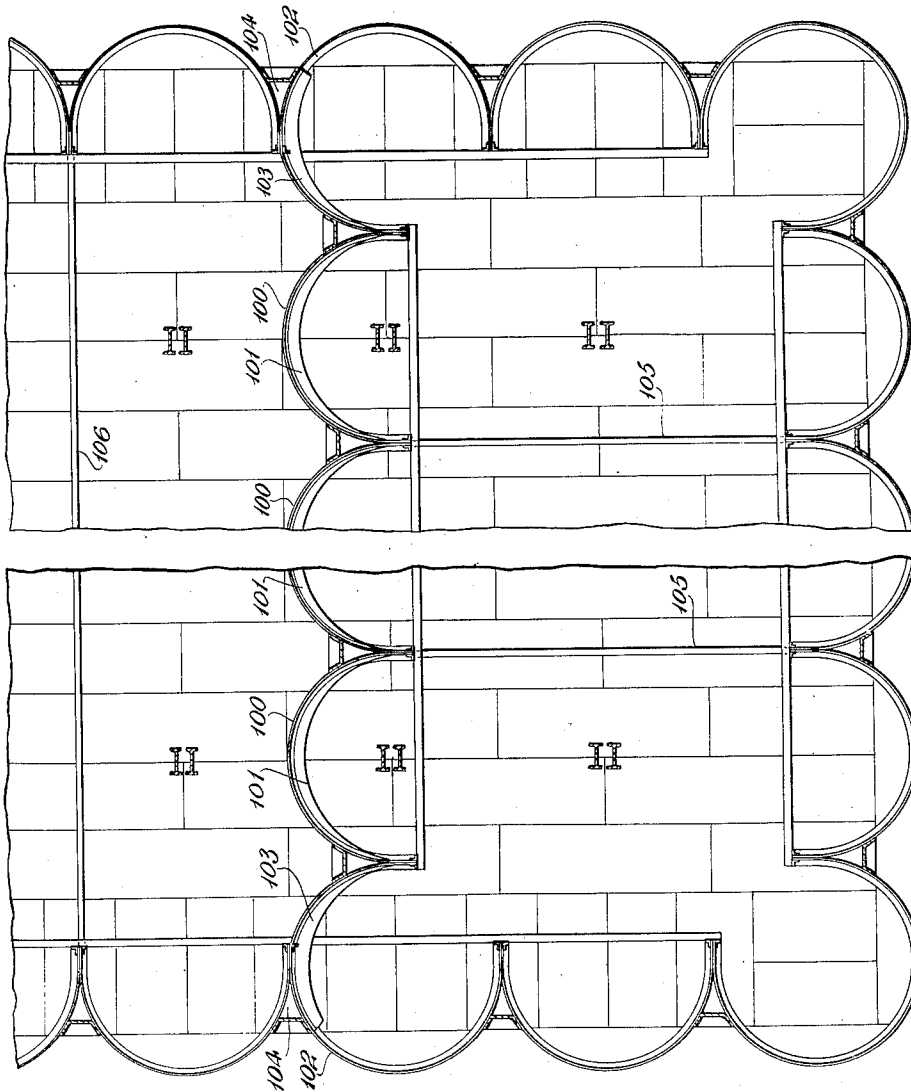


FIG. 8-

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TANK CONSTRUCTION

Application filed March 13, 1930. Serial No. 435,516.

This invention has relation to construction of storage tanks and more particularly to a tank of large size comprising straight walls designed for the storage of fluids such as oil and gas.

It has for its object the provision of a tank construction in which stock elements are employed, these elements being adapted to form a tank of any size. As stated in another way, it is the object of the invention to form from stock elements, a tank with straight sides of any capacity desired.

Another object of the invention is the construction of a side wall for a tank which side wall is composed of standard tank elements and braced throughout its length by combining these elements in a peculiar and novel way.

A further object of the invention is the construction of a unit in a tank wall, which unit comprises a pair of adjacent semi-cylindrical tank elements joined by a girder and by braces in such a way as to form a strong wall element.

The results obtained by the construction of the tank disclosed may be summarized as, first, the making of a tank of any size out of the same standard stock elements; two, the utilization of any rectangular site as the location of such a tank, resulting in an economy of ground space for fluid storage, and, third, the utilization in a tank of large size of the known strength of a relatively small circular tank wall, with a minimum of additional bracing means.

Other objects and results of the invention will appear in the detailed description, and the novel features of the invention will be particularly pointed out in the appended claims.

Like reference numerals indicate like parts throughout the several figures of the drawings, in which

Fig. 1 is a perspective view of one corner of a large tank with parts broken away sufficiently to disclose the interior construction of such a tank,

Fig. 2 is a detail of a girder employed to brace adjoining portions of semi-cylindrical tank sections,

Fig. 3 is a plan broken away to show the top and interior construction,

Fig. 4 is an interior elevation of a wall of the tank with parts broken away,

Fig. 5 is a side elevation of the girder employed to brace adjacent semi-circular wall elements.

Figs. 6, 7, and 8 are detail views, and

Fig. 9 is a view similar to Fig. 3, but showing how the tank may be provided with a partition wall and with cross tie members.

The term "semi-circular" as used in this specification is intended to include not only sections which are true semi-circles, but any geometrical equivalent, such as convex or concave sections designed to receive fluid pressure and distribute it throughout its area, and of sufficient curvature in horizontal cross section to possess a substantial transverse rigidity.

The term "rectangular" is used in this specification to refer to tanks with angled corners, i. e., having straight walls of substantial size. The term "small radius" is meant to indicate sizes of round tanks of relatively small size.

The invention may be said to consist first, of a novel unit of wall construction, secondly, in the joining of these units together in the formation of a tank wall, and third, the employment of tank walls of this construction in connection with top and bottom plates to form a tank of large size. These several features will now be described in detail.

The tank wall consists of a series of semi-cylindrical sections 10. These may be roughly described as one-half of a circular tank of small radius. These semi-circular sections are joined together as shown in Fig. 1 so that their open portions will be within a tank of which they form a part. Two such sections joined together in a novel manner may be said to constitute a unit of a tank wall.

Referring to Fig. 2, the semi-circular section 10' is shown as consisting of a curved plate and a girder section 15 while the semi-circular section 10'' comprises a curved plate and a girder section 16. It will be appreciated that the plates 10' and 10'' are substantial extensions of the girder plates 15 and

16 and that a full semi-circular section 10 will consist of a section 10' and one plate 15 and one plate 16, the last plate not shown in Fig. 2, these parts being made up at the factory and shipped to the site for assembling.

The girder proper has been designated by the numeral 14 and consists of the two curved plates 15 and 16, a girder back 19 extending the full height of the tank wall, bracing the divergent ends of the plates 15 and 16, and constituting the tension flange of the girder. This girder back is flanged at its edges and at its ends. The edge flanges are welded or riveted to the plates 15 and 16 while the bottom and top flanges are similarly secured, when the unit is in place, to the bottom and top plates of the tank.

At the bottom of the plates 15 and 16 there is attached curved angles 15' and 16' which are suitably secured to the bottom plates of the tank. In fact these curved flanges are placed upon the bottom plates in the shop and are attached to the plates 15 and 16 in the field by simply bolting them thereto. Angles 17 and 18 are secured for the full height of the tank, to the inner edges of the plates 15 and 16 and are employed with the plates 17' and 18' (see Fig. 5) to make up the compression flange of the girder. It will be appreciated that these brace plates are merely strengthening elements to the girder and are located preferably at a point above the floor of the tank and extend up to within one-third of the distance to the top. It is at this part of the tank that the greatest unbraced lateral strain occurs.

It will be appreciated that the girder when in place is mounted upon the bottom plates of the tank which extend to the outer edge of the lower flange of the girder back, and along this line of this flange and the bottom plate is the calking line of the tank. The semi-circular member 10 extends beyond this line and a sketch plate 20 (see Fig. 3) is provided and this sketch plate is attached to the section 10' by means common in the art of circular tanks, as shown in detail in Fig. 8. It comprises a curved angle element 10a that is riveted or welded to the sketch plate and to the upright section 10' with provision for a calking line, or may be welded.

The elements just described constitute a unit of a wall of a tank in which the several desirable features in tank construction have been attained, namely, a standardization of parts and a simplicity of manufacture, as well as a minimizing of the work of assembling. A part of the assembly is done in the shop and the rest in the field. In both instances the assembling operation consists merely of the simple operations of bolting, riveting, and welding.

These units are assembled in a manner shown to form a wall for the tank. There is provided along this wall a brace angle 22

which is attached to the flanges 17 and 18 at a point about one-third the distance from the floor and at the point of greatest unbraced strain. A strut 23 is provided in the end unit. At the upper end of the plates 15 and 16 are provided support angles 24 and 25 to which cross angles 22' and 23' are attached. These are not necessary to maintain strain but are provided for the purpose of supporting beams and purlins that will hereinafter be described.

The floor of the tank is constructed of plates of standard size and these are field-connected as is customary. It supports columns 30 which rest upon the floor directly or through the medium of a wooden piece as is usual, and support at their upper end cross beams 31. These cross beams are attached in any suitable manner to the columns and at their ends where they meet the semi-circular sections they rest upon the cross piece 22' when in its lower position as permitted by the angles 24 as shown in Fig. 7. At right angles to the cross beams 31, purlins 31' are placed. The usual practice is not to bolt these upon the cross beams, and at their ends where they lie within the semi-circular sections, they rest upon the cross pieces 22' or upon the cross pieces 23' in their upper position as permitted by the angle 24, as shown in Fig. 6. Upon these purlins the roof is supported. The roof consists, as does the floor, of plates which are connected together, but not necessarily of as stout material.

In this construction of tank the floor and the top constitute tie members for the walls, but in addition thereto special tie members 106, as shown in Fig. 9, may be provided which extend across the whole of the tank and tie one girder member to the opposite girder member on the other side of the tank. It would be appreciated that these tie members will be provided in sufficient quantity necessary to take care of tanks of greater height than is customary.

At the corner of the tanks I have shown a member 26 (see Fig. 3) which is a standard section except that its plate corresponding to the plate 10' is longer and consists of more of a circle than the side wall members. One of its sketch plates 20' will of course, be shorter than the other, but the construction other than this will be the same as for the smaller units.

It has been stated that any shape of tank might be formed of the parts which have been herein described. In the case of an L-shaped tank, the inside angle is formed in just the same way as the corner 26 with the exception that instead of being three-fourths of a circle it is approximately one-fourth of a circle, that is, it is smaller than the standard side wall sections but formed in analogous manner.

From the description of the construction

just made, it will be appreciated that with a limited number of differently shaped manufactured parts, a tank of any dimension may be provided and also of various shapes to fit the site on which the tank is to be placed.

means is provided for supporting said tank top throughout its area.

In testimony whereof I affix my signature.

CLIFFORD M. PRITCHARD. 70

In Fig. 9 there is shown how a partition may be placed in a tank of the construction described. A perusal will be sufficient to demonstrate that the intermediate sections 100 of the partition are substantially the same as the outside wall units except that stiffening curved angles 101 have been added to such units. The end sections 102 of the partition are substantially the corner units 26 of the ordinary construction with a stiffening curved angle 103 added. The curved plate 102 forms a part of the girder 104 in place of the usual girder plates 15 and 16. The partition is secured to the tank top and bottom in the same manner as the outside wall.

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In this figure there is shown the tie rods 105 and 106 by means of which additional bracing means may be secured if found necessary in special installations.

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It will be appreciated that by constructing the walls of a tank as herein described, strength is imparted to them by reason of combining the two features, namely, the upright elements having a curvature in horizontal cross section sufficient to impart thereto a substantial amount of transverse rigidity, and the tying across at the top of the tank the oppositely disposed walls, whereby there is no tendency of buckling of the walls, and whereby there is avoided the necessity of providing a succession of cross ties from one wall to the opposite wall throughout their height. If the tank should be of abnormal height, a single tie rod might be used, as disclosed in Fig. 9 at 106, which will take care of the additional strains due to the increased head of fluid in the tank.

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Having described my invention, what I claim as new and desire to secure by Letters Patent is:

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1. A tank having straight opposed walls, each wall comprising a series of connected substantially-vertical elements having a curvature in horizontal cross section sufficient to impart to the element a substantial amount of transverse rigidity, and tie means operatively interposed between and across the tops of said walls, the curved form of the vertical elements combining with the cross top tie to brace the tank as a whole.

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2. The tank of claim 1 in which adjacent vertical elements are connected by means of a girder construction, of which the element ends form a part.

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3. The tank of claim 1 in which the tank top constitutes the tie means.

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4. The tank of claim 1 in which the tank top constitutes the tie means and in which

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