SYMMENTRICALLY SHAPED AND EASILY DUPLICATED PRESSURE TANK

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Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

Fig. 6

Fig. 7
My Invention relates to improvements in symmetrically shaped and easily duplicated pressure tanks and it more especially comprises the features pointed out in the annexed claims.

The purpose of my invention is to provide a simplified form of pressure tank for the storage of liquids or gases formed so that the tanks are easily adaptable to changes in capacity; that avoids the large expense of construction of pressure tanks as conventionally made heretofore; that avoids the distortions in shape and diameter of tanks as at present used; that avoids the large amount of reinforcing usually used in tanks of this type; that secures a maximum strength which is not subject to distortions; and that permits the gaging of tank contents to a degree of accuracy unattainable in present pressure tank practice.

With these and other ends in view I illustrate in the accompanying drawing such instances of adaptation as will disclose the broad underlying features of the invention without limiting myself to the specific details shown thereon and described herein.

Fig. 1 is a side elevation of a completed tank.

Fig. 2 is an elevation in section of Fig. 1.

Fig. 3 is a plan view. Figs. 4 and 5 illustrate two types of bottom supports for the tank.

Fig. 6 is a detached view of the top portion, showing the vapor storage connection to the inside core of the tank.

Fig. 7 is an enlarged section of a reinforcing ring of T-shape cross-section also serving as supports for sheets of insulating material.

In practicing my invention I may use whatever equivalents and alternatives of construction that the exigencies of varying conditions may demand without departing from the broad spirit of the invention.

My pressure tanks include a central tubular core unit 5 that is welded to a semicircular convex shaped top 2 and bottom unit 3. The bottom unit rests on concrete footing 4 or other kind of support. A plurality of standard sized plates 7 curved lengthwise to the desired radius are positioned between the top 2 and bottom section 3. These plates are of standard width and length. They are electrically or otherwise welded to secure them to each other. The shaping of these plates involves only a conventional rolling operation.

The capacity of my pressure tanks is under selective control, that is, by simply adding extra rows of the sheets 7 between the top and bottom will increase the capacity according to the number of the sheets which are added.

One form of support may be a concrete base 4 in which a drain pipe 13 may be imbedded as shown in Fig. 4. The other form of support shown in Fig. 5 may consist of structural steel or other form of posts 16 resting on a concrete foundation 17. The center tubular core 5 may be connected at its top 18 to the lower edge of the top section 2. It may, through pipe 18, receive and store any excess of vapor of the tank 1. A drain 14 may also be located at the bottom 11 of the core 5. In this way the central core 5 may function somewhat as an expansion tank.

The heavy T rings 3 placed between each row of vertically positioned plates 7 reinforce the structure against internal vacuum and direct external pressure. Their shape enables me to maintain a higher vacuum than is practical in existing pressure tanks. In ordinary tanks of more than one hundred feet in diameter, any vacuum in excess of one-half ounce per square inch may collapse a tank. Such a catastrophe is entirely eliminated in my improved form of tank structure.

During the erection of my pressure tanks the central tube or core 5 is first secured to the bottom section 3. It extends to the required height to which the tank is to be built and on its upper end the base of a revolving crane may be supported, the crane serving to lift the successive plates for the side of the tank and the required plates to form the top.

In the construction of pressure tanks of large diameter the circumference is of such a dimension that the plates have very little curvature, approximating a flat surface, which makes the walls easily susceptible to be collapsed. As stated above, these conditions do not arise in my structure because of the T-shaped reinforcing rings 9 and the unstrained plates 7.

Each one of the reinforcing rings 9 has an outward radial projection 20 which forms the stem of the T cross-sectional ring 9. Between these extensions 20 insulating sheets 21 of Celotex or other insulating material may be placed vertically. Insulating material will also cover the top portion 2 of the tank 1. These sheets may be held in place by external bands or otherwise. The top and bottom portions, each approximate one-half of a semicircular convex shape that are joined by a vertical cylindrical outer wall 1 of maximum diameter and a tubular inner wall 5 of smaller diameter. The plates 1 abut the rings 3 and the extensions 20. They are welded at 22.
The top and bottom sections are duplicates of each other insofar as the plates 8 etc. are concerned. These are grouped in a radial direction. The bottom portion may have internal reinforcements 12 as shown in Fig. 4 and the top portion may have modified internal reinforcements 18 if found necessary.

As stated, the sheets 7 which form the vertical cylindrical shell are of standard size. They are assembled with the long dimension placed circumferentially. The narrow width of say six feet permits the capacity of the tank to be changed according to the storage capacity required for any given installation. This simplifies the fabrication of my tanks in contrast to the complexity and the varying sizes and shapes of plates that are required in forming spherical tanks.

I can form my tanks of standard dimensions that are simple multiples of a unit tank, for instance if the top and bottom sections having an effective diameter of ten feet and a core of five feet diameter the total outside diameter will be 25 feet, the height for six different capacities will range in six foot steps from say 10 feet to 46 feet in height, bringing about a change in volume from about 1162 barrels to approximately 3686 barrels. By increasing the outside diameter to approximately 35 feet and the height from 21 to 51 feet, the change in capacity is approximately from 2975 barrels to approximately 7935 barrels.

A further increase of 10 feet in the outside diameter (45 feet) and a change in height from 26 to 50 feet, the capacity is increased from approximately 6,889 barrels to 12,821 barrels. An outside diameter of 55 feet and a change in height from 31 to 55 feet will change the approximate capacity from 10,785 barrels to 20,883 barrels. An outside diameter of 65 feet and a change of height from 36 to 60 feet approximately changes the capacity from 16,423 barrels to 30,603 barrels.

A further increase of 20 feet in outside diameter and a change in height of 46 feet to 64 feet in four steps approximately varies the storage from 38,765 barrels to 56,941 barrels. An outside diameter of 105 feet and a change of height from 56 to 74 feet approximately changes the capacity from 69,070 barrels to 96,840 barrels. An outside diameter of 125 feet and a change of height from 66 feet to 78 feet approximately changes the capacity from 116,253 barrels to 142,559 barrels.

The addition of each six foot shell plate to a ten foot tank radius adds 504.9 barrels; a fifteen foot radius, 991.9; twenty foot, 1683.0; twenty five foot, 2324.4; thirty foot, 3545.0; forty foot, 6058.0 and a fifty foot tank radius increases the capacity to 9256.8 barrels of about 42 gallons per barrel. The tanks may be made structurally for pressures of 5, 10, 15, and 20 to 25 pounds per square inch.

An external stairway 6 may be provided to make the top of the tank accessible.

What I claim is:

1. A pressure tank comprising an outer chamber of relatively large diameter, a smaller diameter inner chamber the outer chamber surrounding the inner chamber circumferentially and both chambers standing vertically, an annular cover of half-cross-sectional area for the outer chamber, a similar member closing the bottom of the outer chamber, separate closures for the top and bottom of the inner chamber, a support for the bottom closure, an outlet from the bottom of the outer chamber, a separate outlet from the bottom of the inner chamber, and a passageway from the top of the outer chamber to the top of the inner chamber.

2. A pressure tank comprising an outer cylindrical wall of maximum diameter being open at the top and bottom, an inner cylindrical wall of lesser diameter, a closure for said inner cylindrical wall at the top and the bottom defining a closed inner chamber, a half convex circumferentially continuous member secured to the outer and inner wall at the top thereof, a similar member secured to the bottom of the outer and inner wall both members defining an outer chamber, a suitable support for the bottom member, an outlet from the bottom of the outer chamber, a separate outlet through the closed bottom of the inner chamber, and a separate outlet from the top of the half convex circumferentially continuous member downward and through the closure at the top of the inner chamber.

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