ABSTRACT

A fluid storage tank is formed by a plurality of wall panels positioned on top of a floor mat. Each wall panel includes a curved sheet of a non-metal material, for example fiberglass, first and second side frame members and a plurality of reinforcing strips that extend between the side frame members. The reinforcing strips are secured to the side frame members. The panels include complimentary fastening members that allow the curved side panels to be connected end to end so as to form a circular fluid storage tank in conjunction with a floor mat.
LIQUID STORAGE TANK FORMED OF A PLURALITY OF PANELS


BACKGROUND OF INVENTION

[0002] 1. Field of the Invention
[0003] This invention relates to a fluid storage tank for example, for water that can be remotely assembled at a work site where there is a need for storing a fluid. An example of such a worksite is at an oil or gas well where a fracturing operation is to be performed.

[0004] 2. Description of Related Art
[0005] In the oil and gas industry, water storage has become an issue due to the large amount of barrels of water required to perform drilling operations. Cost of transporting a large number of tanks to a location, and logistical problems of having enough space at the well site to accommodate their positioning has forced the oil and gas industry to find a solution. The solution that has developed is the use of a single mobile erecting tank. These tanks eliminate a large fleet of storage vessels and the cost of transporting them to location.

[0006] These large capacity tanks normally comprise 16 single wall panels that connect together side by side, forming in one embodiment a 122 ft. diameter tank with a height of 12 ft. After they are assembled a rubber, plastic, or polypropylene sheet is positioned in the inside and the edges are laid over the top rail of the tank. These edges of the sheet are secured to the top rail by the use of e-clamps.

[0007] The wall panels are typically formed of steel and include connecting pins and holes for securing a plurality of the panels together to form in conjunction with a floor plate a temporary fluid storage tank. The panels are very heavy and difficult to manipulate and are relatively expensive. The application referred to above discloses a unique arrangement for constructing a water storage tank.

BRIEF SUMMARY OF THE INVENTION

[0008] The present invention is directed to a wall panel that is adapted to be connected to a plurality of similar wall panels so as to form a fluid storage tank in combination with a suitable floor.

[0009] The panel is constructed of for example, fiber reinforced polymer such as fiberglass and first and second end members that are secured to the fiberglass wall body. A plurality of reinforcing strips extend between and are secured to the end members to give added strength to the panels. A plurality of the panels are secured to each other to form the side wall of the tank. Other materials for the panel include any plastic or moldable non-metal material.

[0010] The panels according to the invention disclosed herein are much lighter than the steel panels currently in use and consequently are much easier to manipulate. They are also less expensive.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S)

[0011] FIG. 1 is a perspective view of a fluid tank formed from a plurality of side wall panels according to an embodiment of the invention.
[0012] FIG. 2 is a perspective view of a panel in accordance with an embodiment of the invention.

[0013] FIG. 3 is a front view of the joint between adjacent panels forming the storage tank.
[0014] FIG. 4 is a perspective view of the securing assembly for adjacent panels.
[0015] FIG. 5 is a perspective view of the covering placed over the joint and securing assembly shown in FIGS. 3 and 4.
[0016] FIG. 6 is a front view of a panel according to an embodiment of the invention.
[0017] FIG. 7 is a cross-sectional view taken along line 7-7 of FIG. 6.
[0018] FIG. 8 is a perspective view of the gripping device.
[0019] FIG. 9 is an exploded perspective view of the connection between two panels.
[0020] FIG. 10 is a cross-sectional view of the connection between two panels.

DETAILED DESCRIPTION OF THE INVENTION

[0021] As shown in FIG. 1, a remotely assembled fluid tank 10 includes a plurality of wall panels 11 joined together at 17. A trough 15 is dug in the ground interior of the storage tank to form a sump for draining at the end of the treating or completion process. A circular ground mat 13 is placed on the ground such that it extends a given distance outwardly of the wall panels for example by 1-4'. A flooring mat may then be positioned within the panels and extends upwardly and over the panels to form the tank in the manner described in copending application Ser. No. 13/584,883 filed Aug. 14, 2012. Each panel includes a gripping device 14 for maneuvering the wall panels.

[0022] The specific construction of an embodiment of the wall panel of the instant invention will be discussed with reference to FIG. 2. The wall panel includes a slightly curved planer sheet 29 formed of, for example, a fiber reinforced polymer such as fiberglass having a top portion 21, a bottom portion 22, a first side frame member 23 and a second side frame member 25. Top portion 21 and bottom portion 22 have an enlarged cross-section area as shown in FIG. 7.

[0023] First side frame member 23 comprises a vertically extending plate that extends from the bottom 22 to the top 21 of the fiberglass sheet. First side frame member is made of a relatively strong rigid material such as steel and includes a plurality of apertures 24 for receiving protrusions 26 located on the second side frame member 25 when the panels are connected together to form the tank.

[0024] Second side frame member also extends from bottom portion 22 to top portion 21 and is formed of a material the same as or similar to that of first side frame member 23.

[0025] When the wall panels are arranged to form a circular side wall for a tank 11 as shown in FIG. 1, protrusions 26 are positioned through openings 24 located in first side frame member 25 and are held in place by pins 53 that extend through openings 54 provided in protrusions 26. A flexible strip of material 55 such as felt or rubber can be placed over the joint 17 as shown in FIG. 5.

[0026] First and second side frame members 23 and 25 are securely fixed to the fiberglass sheet 29 by any suitable fasteners such as round headed bolts and nuts with the round head of the bolts located on the interior side of the panel.

[0027] Extending between first and second side frame members 23 and 25 are a plurality of reinforcing strips 31. Reinforcing strips 31 have a relatively thin cross-section compared to their width and may be about ¾" to about 1½" in thickness and about 1-6" in width. Their length will depend
upon the length of the panel but in any event they will extend from first side frame member 23 to second side frame member 25.

[0028] Strips 31 are fixedly secured to side frame members 23 and 25 by any suitable means such as welding.

[0029] After the strips have been secured to the side frame members, a layer of fiberglass can be applied over the strips and sheet 29 for additional strength. In this case the strips 31 become embedded in the panel as shown in FIG. 7.

[0030] Gripping device 14 includes a pair of spaced apart plates 28 and 27 secured to strips 32 and 33 that are secured to the panel sheet 29. A pair of L-shaped support brackets 30 are secured to the panel sheet 29 and the outer side of each plate 28 and 27 as shown in FIG. 2. Each plate has a top flange 41 that extends downwardly and a lower flange 42 also extending downwardly as shown in FIG. 8. Lower flange 42 has an aperture 43 located therein for receiving a locking leg of a lifting mechanism.

[0031] The gripping device 14 is sized to receive a lifting plate and latch mechanism currently used as an attachment for front end leaders. The lifting plate is positioned as to fit under the top flange 41 and a latching mechanism is moved through aperture 43. In this manner, a front loader may be utilized to carry and position the individual panels at the worksite to form the outer wall of the tank.

[0032] The connection between adjacent panels is illustrated in greater detail in FIGS. 9 and 10. As shown in FIG. 9, first side frame member 23 includes two flat portions 52 and 57 that form an obtuse angle. Reinforcing strips 31 are welded to flat portion 57. Flat portion 52 includes a plurality of apertures 24 and a plurality of reinforcing members 51 that have an aperture 59 that conforms to apertures 24 in flat portion 52. A reinforcing bar 58 extends from the top to the bottom of flat portion 52.

[0033] Second side frame member 25 includes a flat plate 61 and an angle strip 67 having sides 62 and 63. A plurality of protrusions 26 extend outwardly of side 63. The other end of reinforcing strips 31 is welded or otherwise fixed to plate 61.

[0034] As shown in FIG. 10, when the panels are joined together, side 63 of second frame member 25 is adjacent flat portion 52 of the first frame member 23 such that protrusions 26 extend through apertures 24 and 59. Pins 53 can then be inserted into apertures 54 in the protrusions to secure the wall panels together.

[0035] As shown in FIG. 7, the lower portion 21 of panels 29 may include a curved section 70 over which the flooring mat may extend.

[0036] Although the present invention has been described with respect to specific details, it is not intended that such details should be regarded as limitations on the scope of the invention, except to the extent that they are included in the accompanying claims.

1. A wall panel for a fluid storage tank comprising:
   a single, one piece curved sheet formed of a non-metal material and having a first side portion and a second side portion;
   a first side frame member attached to the first side portion of the curved sheet;
   a second side frame member attached to the second side portion of the curved sheet;
   a plurality of reinforcing strips extending from the first side frame member to the second side frame member and attached to both the first and second side members at a top portion, a bottom portion and an intermediate portion of the side members, said reinforcing strips comprising a thin band of material.

2. A wall panel for a fluid storage tank as claimed in claim 1 wherein the non-metal material is fiberglass.

3. A wall panel according to claim 1 further including a gripping device attached to the wall panel.

4. A wall panel according to claim 1 wherein the curved sheet has a top portion and a bottom portion each having a thickness greater than that of a central portion of the curved sheet.

5. A wall panel according to claim 1 wherein the reinforcing strips are embedded in the non-metal material is fiberglass.

6. A wall panel according to claim 1 including complimentary fastening means located on the first and second side frame members for attaching a plurality of the side wall panels together to form a fluid storage tank.

7. A fluid storage tank comprising:
   a floor; and
   a plurality of wall panels is claimed in claim 6 connected to each other and positioned on top of the floor.

8. A wall panel as claimed in claim 6 wherein the non-metal material is a fiber-reinforced polymer.

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