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TANK CONSTRUCTION

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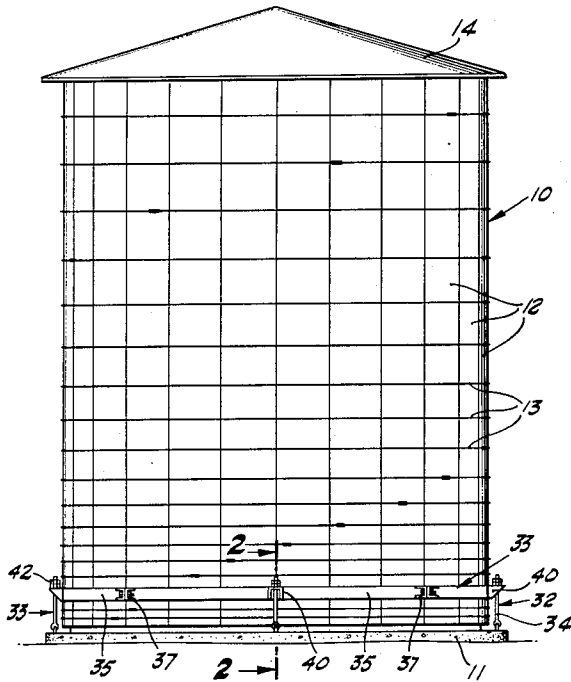


FIG. 1.

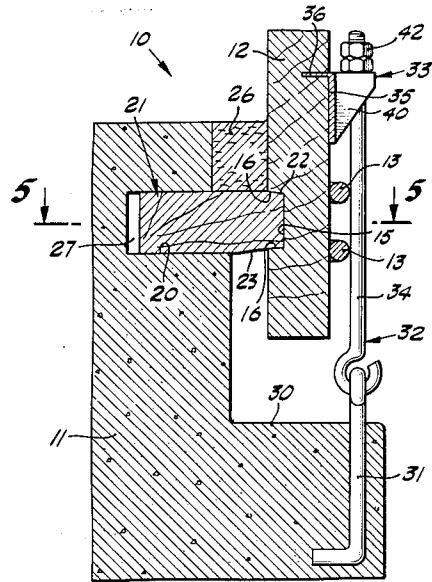


FIG. 2.

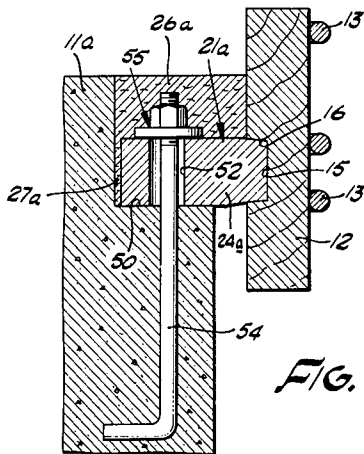


FIG. 3.

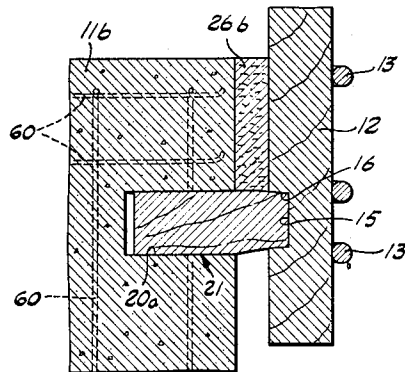


FIG. 4.

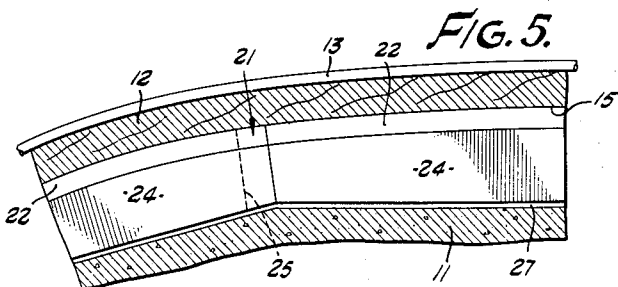


FIG. 5.

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TANK CONSTRUCTION

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11 Claims. (Cl. 20—1.4)

This invention relates to tank constructions and has particular reference to combination wood and concrete tank structures.

Wood tanks have long been used for the storage of materials, and while by far the greater number of wood tank installations have been and are used for water storage, for drinking purposes, plant supply, fire protection, etc., such installations find many other uses in practically every industry.

Conventional wood tanks are of stave and hoop construction and are provided with wood bottoms. Recent advances in this field have led to the substitution of concrete for the wood bottom or flooring, especially in the case of large tanks, and also where a sloping or conical bottom is desired. A major difficulty with such wood and concrete construction has been in providing an adequately fluid tight joint between the concrete bottom and the wood staves which form the sides of the tank, and at the same time providing proper anchorage for the tank. One of the principal objects of this invention is, therefore, to provide a combination wood and concrete tank structure which overcomes this difficulty.

More specifically, it is an object of this invention to provide a novel wood and concrete tank structure which is equally as fluid tight as conventional all wood tanks and which is properly anchored to resist overturning forces due to wind stresses, earthquakes and other loads.

Another object of this invention is to provide wood and concrete tank structures which are designed to utilize conventional stave and hoop members.

A further object of this invention is to provide wood and concrete tank structures which are relatively inexpensive and easily erected with a minimum of labor.

Other objects and advantages of this invention it is believed will be readily apparent from the following detailed description of preferred embodiments thereof, when read in connection with the accompanying drawings.

In the drawings:

Figure 1 is a side elevation of a tank embodying a preferred form of this invention.

Figure 2 is a sectional view taken substantially on the line 2—2 of Figure 1.

Figure 3 is a sectional view similar to Figure 2, but illustrating a modified form of the invention.

Figure 4 is a sectional view similar to Figure 2, but illustrating a further modified form of the invention.

Figure 5 is a sectional view taken substantially on the line 5—5 of Figure 2.

Referring now to the drawings, the tank which constitutes a preferred embodiment of this invention is generally indicated 10 and comprises a concrete foundation and tank bottom 11, a vertical cylindrical side wall formed of a plurality of wood staves 12 held in position by means of standard hoops 13, and a cover 14 which is attached to the staves in the conventional manner familiar to those skilled in the art. The wood staves 12 are substantially identical to those employed in conventional wood tank structures, preferably being milled to true radii on the

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outside and inside surfaces and to true radial planes on the longitudinal edges. The staves are each provided with a groove or croze 15 having tapered side walls 16, the grooves being cut adjacent to and spaced from the lower edges of the staves so that a continuous annular groove is formed when the staves are all assembled as shown. The spacing of the groove 15 from the bottom edge of the staves varies depending upon the stave thickness.

In a preferred structure, illustrated in Figure 2, the concrete tank bottom 11 is provided with a continuous annular groove 20 in the outer surface thereof in which is seated a segmental wood ring 21 having chamfered or bevelled outer edges 22 and 23 onto which the staves are driven, the ring edges forming a driving fit with the tapered groove 15. As shown best in Figure 5, the individual segments 24 forming the ring 21 are connected together by means of tongue and groove joints 25. It will be noted that the outer vertical surface of the tank bottom, the exposed portion of the ring 21 and the inside vertical surface of the staves all cooperate to form an annular channel or space for the reception of oakum and pitch, indicated at 26, or other caulking compound to provide a water tight seal between the concrete tank bottom and the wood staves. A clearance space 27 is provided between the end of the groove 20 and the ring 21 to allow for compression of the staves due to cinching of the hoops.

As shown in Figure 2, the concrete foundation 11 is provided with a horizontal step portion 30 extending outwardly beyond the staves 12, and embedded in the concrete below this step portion is a plurality of eye bolt members 31 forming a part of the double eye bolt assemblies 32. Anchored to the staves by means of a ring connector assembly 33 are the other members 34 of the double eye bolt assemblies. The ring connector assembly comprises a number of steel angle segments 35, the short legs 36 of which are embedded in the staves. The segments 35 are provided with channel members 37 at the ends thereof and bolted together to form a ring completely encircling the staves 12 (see Figure 1). Welded to the segments 35 at spaced intervals are bracket members 40, each provided with apertures (not shown) through each of which extends one of the members 32 to be secured by means of nut elements 42.

The type of anchorage structure illustrated in Figure 2 and described above has been found to be particularly effective for tanks of relatively small diameter and great height since it provides a rigid, firm footing which is capable of withstanding great stresses.

The modified structure illustrated in Figure 3 is similar to that of Figure 2, differing principally in the anchorage assembly. Here, the concrete bottom 11a is provided with a shoulder 50 upon which rests the segmental wood ring 21a. The ring 21a is substantially identical to the ring 21 with the exception that each of the segments 24a is provided with a pair of elongated apertures 52. Anchorage is provided directly into the concrete foundation by means of the anchor bolts 54 which extend through the apertures 52 and which are secured to the ring 21a by means of nut and washer assemblies 55. It will be noted that in the structure of Figure 3 is provided a clearance space 27a, and the caulking compound 26a is again placed in the channel formed by the outer surface of the tank bottom, the exposed portion of the ring 21a, and the inside wall of the staves. This structure is advantageous for use in tanks where overturning loads are not unduly great, and where it is desired to use a minimum of steel.

In the modified form of the invention illustrated in Figure 4, the concrete foundation and tank bottom 11b is substantially cylindrical and is preferably reinforced with steel bars 60 embedded therein. As in the struc-

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ture of Figure 2, an annular groove 20a is provided for the reception of the segmental wood ring 21. It will be noted that this arrangement requires a lesser amount of caulking material 26b, and it is further advantageous in reducing to a minimum the necessity for outside steel work.

While I have fully described preferred embodiments of my invention, it is to be understood that I do not wish to be limited to the details herein set forth, but my invention is of the full scope of the appended claims.

I claim:

1. A tank structure comprising a plurality of wood staves forming a cylindrical side wall, each of said staves having a groove adjacent the bottom edge and extending inwardly from the inside surface thereof, said grooves forming a continuous annular groove in said side wall, a concrete foundation forming the bottom of said tank, and a wood ring secured to said concrete foundation and having a portion extending outwardly therefrom into said annular groove, said concrete foundation, the outwardly extending portion of said wood ring, and said side wall cooperating to form a continuous channel for the reception of a caulking compound.

2. A tank structure comprising a plurality of wood staves forming a cylindrical side wall, each of said staves having a tapered groove adjacent the bottom edge and extending inwardly from the inside surface thereof, said grooves forming a continuous annular groove in said side wall, a concrete foundation forming the bottom of said tank, and a wood ring secured to said concrete foundation and having a portion with bevelled edges extending outwardly therefrom into driving fit relationship with said annular groove, said concrete foundation, the outwardly extending portion of said wood ring, and said side wall cooperating to form a continuous channel for the reception of a caulking compound.

3. A tank structure comprising a plurality of wood staves forming a cylindrical side wall, each of said staves having a groove adjacent the bottom edge and extending inwardly from the inside surface thereof, said grooves forming a continuous annular groove in said side wall, a concrete foundation forming the bottom of said tank, and a segmental wood ring secured to said concrete foundation and having a portion extending outwardly therefrom into said annular groove, said concrete foundation, the outwardly extending portion of said wood ring, and said side wall cooperating to form a continuous channel for the reception of a caulking compound.

4. A tank structure comprising a plurality of wood staves forming a cylindrical side wall, each of said staves having a tapered groove adjacent the bottom edge and extending inwardly from the inside surface thereof, said grooves forming a continuous annular groove in said side wall, a concrete foundation forming the bottom of said tank, and a segmental wood ring secured to said concrete foundation and having a portion with bevelled edges extending outwardly therefrom into driving fit relationship with said annular groove, said concrete foundation, the outwardly extending portion of said wood ring, and said side wall cooperating to form a continuous channel for the reception of a caulking compound.

5. A tank structure comprising a plurality of wood staves forming a cylindrical side wall, each of said staves having a groove adjacent the bottom edge and extending inwardly from the inside surface thereof, said grooves forming a continuous annular groove in said side wall, a concrete foundation forming the bottom of said tank, said foundation having a generally cylindrical, vertical wall with an annular groove therein, and a wood ring seated in the annular groove in said foundation wall and having a portion extending outwardly therefrom into said annular groove, said concrete foundation, the outwardly extending portion of said wood ring, and said side wall cooperating to form a continuous channel for the reception of a caulking compound.

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6. A tank structure comprising a plurality of wood staves forming a cylindrical side wall, each of said staves having a tapered groove adjacent the bottom edge and extending inwardly from the inside surface thereof, said grooves forming a continuous annular groove in said side wall, a concrete foundation forming the bottom of said tank, said foundation having a generally cylindrical, vertical wall with an annular groove therein, and a segmental wood ring seated in the annular groove in said foundation wall and having a portion with bevelled edges extending outwardly therefrom into driving fit relationship with said annular groove, said concrete foundation, the outwardly extending portion of said wood ring, and said side wall cooperating to form a continuous channel for the reception of a caulking compound.

7. A tank structure comprising a plurality of wood staves forming a cylindrical side wall, each of said staves having a groove adjacent the bottom edge and extending inwardly from the inside surface thereof, said grooves forming a continuous annular groove in said side wall, a concrete foundation forming the bottom of said tank, a wood ring secured to said concrete foundation and having a portion extending outwardly therefrom into said annular groove, said concrete foundation, the outwardly extending portion of said wood ring, and said side wall cooperating to form a continuous channel for the reception of a caulking compound, and means for anchoring said side wall to said concrete foundation.

8. A tank structure comprising a plurality of wood staves forming a cylindrical side wall, each of said staves having a groove adjacent the bottom edge and extending inwardly from the inside surface thereof, said grooves forming a continuous annular groove in said side wall, a concrete foundation forming the bottom of said tank, a wood ring secured to said concrete foundation and having a portion extending outwardly therefrom into said annular groove, said concrete foundation, the outwardly extending portion of said wood ring, and said side wall cooperating to form a continuous channel for the reception of a caulking compound, means for anchoring said side wall to said concrete foundation, said means including a ring encompassing and having a portion embedded in said side wall, and an anchor bolt assembly secured to said latter ring and embedded in said concrete foundation.

9. A tank structure comprising a plurality of wood staves forming a cylindrical side wall, each of said staves having a groove adjacent the bottom edge and extending inwardly from the inside surface thereof, said grooves forming a continuous annular groove in said side wall, a concrete foundation forming the bottom of said tank, a wood ring secured to said concrete foundation and having a portion extending outwardly therefrom into said annular groove, said concrete foundation, the outwardly extending portion of said wood ring, and said side wall cooperating to form a continuous channel for the reception of a caulking compound, means for anchoring said side wall to said concrete foundation, said means including a segmental ring encompassing and having a portion embedded in the exterior portion of said side wall, and an anchor bolt assembly secured to said latter ring and embedded in said concrete foundation.

10. A tank structure comprising a plurality of wood staves forming a cylindrical side wall, each of said staves having a tapered groove adjacent the bottom edge and extending inwardly from the inside surface thereof, said grooves forming a continuous annular groove in said side wall, a concrete foundation forming the bottom of said tank, said foundation having a generally cylindrical, vertical wall with an annular groove therein, a segmental wood ring seated in the annular groove in said foundation wall and having a portion with bevelled edges extending outwardly therefrom into driving fit relationship with said annular groove, said concrete foundation, the outwardly extending portion of said wood ring, and said

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side wall cooperating to form a continuous channel for the reception of a caulking compound, and means for anchoring said side wall to said concrete foundation, said means including a segmental ring encompassing and having a portion embedded in the exterior portion of said side wall, and an anchor bolt assembly secured to said latter ring and embedded in said concrete foundation.

11. A tank structure comprising a plurality of wood staves forming a cylindrical side wall, each of said staves having a groove adjacent the bottom edge and extending inwardly from the inside surface thereof, said grooves forming a continuous annular groove in said side wall, a concrete foundation forming the bottom of said tank, said foundation having a generally cylindrical, vertical wall with a horizontal shoulder portion, a wood ring secured to said shoulder portion, said ring being provided

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with a plurality of apertures, and anchor bolt means extending through said apertures and embedded in said foundation, and said ring having a portion extending outwardly therefrom into said annular groove, said concrete foundation, the outwardly extending portion of said wood ring, and said side wall cooperating to form a continuous channel for the reception of a caulking compound.

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