ABSTRACT

A lined hollow wood body formed of a plurality of staves, each of which is covered across its inner surface and edge faces by a plastic liner mechanically locked in place by the mating edges of adjacent stave sections. A bottom wall having a plastic liner on the inner surface thereof is secured to the inner side of the body in a fluid tight relation. Also, an annular seal is interposed between an annular shoulder on the bottom wall and the inner side of the body to form a second sealing means therebetween.

6 Claims, 6 Drawing Figures
Fig. 1.

Fig. 3.

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This invention relates to a lined hollow wood body such as a wood tank, wood pipe, conduit and the like. In the construction of hollow wood bodies for use as tanks or pipes for the storage and conveyance of fluids, it is necessary to provide adequate sealing means for these bodies to render them fluid tight. To this end, the interior of the tank or pipe section is either coated with an impervious protective liner or provided with a layer of impervious sheet material bonded to the inner surface of the body to render the structure fluid tight. These wood bodies are conventionally formed of a plurality of staves secured together in an edge to edge relation by means of adjustable hoops. One problem encountered with this type of structure is leakage at the joints between the mating edges of adjacent staves. One attempt to solve this problem is disclosed in U.S. Pat. No. 3,329,174, granted on July 4, 1967, and assigned to the same assignee as the present application.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide an improved hollow wood body such as a tank, wood pipe, conduit or the like, formed of a plurality of stave sections, each of which is covered across the inner surface and longitudinal edge faces thereof with a liner mechanically secured along the edge faces to provide a fluid tight body.

Another object of the invention is to provide a lined hollow wood body formed of stave sections having individual inner surface protective liners mechanically locked in position between mating edges of adjacent stave sections to form a substantially continuous inner lining for the hollow body. A further object of the invention is to provide a lined hollow wood body having a lined bottom wall secured to the inner surface of the hollow body and having novel sealing means interposed therebetween.

In one aspect thereof, the hollow body of the present invention is characterized by the provision of a plastic liner for each stave section mechanically locked to the stave section by the mating edges of adjacent stave sections. A bottom wall having a liner on the inner surface thereof is secured to the inner surface of the hollow body in a fluid tight relation. The bottom wall has an annular shoulder indenting from the peripheral edge of the wall for compressing an annular seal between such shoulder and the inner surface of the hollow body to form a second sealing means therebetween.

The foregoing and other objects, advantages and characterizing features of the present invention will become clearly apparent from the ensuing detailed description of an illustrative embodiment thereof, taken together with the accompanying drawings wherein like reference characters denote like parts throughout the various views.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view illustrating a wood tank or wood pipe section constructed in accordance with the present invention.

FIG. 2 is a fragmentary top plan view, on an enlarged scale, showing stave sections connected together and provided with individual liners; FIG. 3 is a fragmentary perspective view, on an enlarged scale, of a stave section of the invention; FIG. 4 is a fragmentary, vertical sectional view, on an enlarged scale, showing a portion of a stave section and a portion of the bottom wall of the wood body of FIG. 1; FIG. 5 is a fragmentary top plan view illustrating another form of a wood body construction of the present invention; and FIG. 6 is a simple illustration in top plan view showing the relationship between the recessed portions of a stave and a peripheral portion of the bottom wall.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

Referring now in detail to the drawings, there is shown in FIG. 1 a wood tank or wood pipe section, generally designated 10, formed of a plurality of elongated stave sections 12 joined together in longitudinal edge to edge relation in a conventional manner well known in the art of wood tank or pipe construction, by means of conventional adjustable hoops 14 extending circumferentially about said tank or pipe section 10.

An inner peripheral groove or rabbet 16 (FIG. 4), commonly referred to as a "croze" in the art is formed in the inner faces of stave sections 12 for receiving the peripheral edge of a generally circular bottom wall member 18 which forms the bottom of tank 10.

Each stave section 12 has a transversely curved or arcuate outer surface 20 and a transversely flat or straight inner surface 22 for the shortest span. Each stave section 12 is provided with a pair of longitudinal edge faces 24, one of which edge faces is provided with a longitudinal bead or tongue 26 and a longitudinal groove 28 adjacent to tongue 26, while the other longitudinal face is formed with a longitudinal groove 30 and a longitudinal bead or tongue 32 adjacent thereto adapted to mate with a corresponding groove and tongue of an adjacent stave section 12 in the conventional manner of assembled wood staves.

Although the mating edges of adjacent stave sections 12 are provided with complementary tongues and grooves for joining adjacent stave sections together, it should be understood that this invention is not restricted to this specific edge face construction but that the opposing edge faces of the stave sections can be formed and shaped to have other configurations which facilitate placing them tightly together in an assembled relation. Also, while the structure of FIG. 1 has been illustrated as that of a tank having stave sections of equal length wherein the top and bottom ends of the stave sections lie in a common transverse plane, it should be appreciated that a wood pipe section can be formed of stave sections disposed in a longitudinally staggered relationship whereby the ends of the section have a more or less crenelated configuration to facilitate the coupling of a number of such conduit or pipe sections together in an end-to-end relation.

While the present invention is applicable to both a wood tank or wood pipe of hollow wood body, it will be convenient to refer to a wood tank construction in describing the invention, it being understood that it is applicable to corresponding parts of a pipe or conduit construction as well.

In accordance with the present invention, the inner surface 22 and the opposite longitudinal edge faces 24 of each stave section 12 are covered with a thin, flexible sheet of plastic material forming a liner 34 for each stave section 12. Preferably, this plastic material is tetrafluoroethylene or polyvinyl chloride but can be any other suitable or similar synthetic plastic material which is completely resistant to solvents, caustics and acids and which can withstand extremely high temperatures. The corners formed between inner surface 22 and the longitudinal edge faces 24 are slightly rounded as at 36 to eliminate sharp bends so that liner 34 can be stretched over inner surface 22 and longitudinal edge faces 24 as at 38 following the outwardly and inwardly curved surfaces of tongues 26, 28 and grooves 28 and 30.

When stave sections 12 are assembled in the construction of wood tank 10, the portions of liner 34 extending between longitudinal edge faces 24 of adjacent stave sections 12 will be forced into grooves 28 and 30 by complementary tongues 26 and 32 to tightly draw liner 34 around inner surfaces 22 and the adjacent longitudinal edge faces 24 forming a liquid tight seal therebetween. Tightening of adjustable hoops 14 about tank 10 compresses stave sections 12 toward each other to further urge the adjacent side portions 38 of liners 34 together providing a tighter seal. The mating tongues and grooves along the longitudinal edge faces 24 of adjacent stave sections 12 constitute a mechanical lock firmly securing liners 34 in place.
Each stave section 12 is provided with a curved recessed portion 40 (FIGS. 4 and 6) indented inwardly of the plane of inner surface 22 and accurately curved across the width of said stave section 12 as shown in FIG. 6. Recessed portion 40 terminates at rabbet or croze 16 and the recessed portions 40 of the stave sections 12 forming the hollow body are in alignment to form an annular recess which serves as an abutment surface against which a sealing member 42 is urged as shown in FIG. 4. Liner 34 overlies recessed portion 40 and terminates at the upper end of croze 16. Sealing member 42 is generally elliptical in cross section (FIG. 4) and can be formed of the same material as liner 34. A sponge rubber insert 43 is enclosed within sealing member 42 to provide more buoyancy for the latter.

Bottom wall 18 comprises a radial rim 44 having a peripheral edge 46, a reduced diameter upper portion 48 and a reduced diameter lower portion 50. The periphery of upper portion 48 constitutes an annular abutment shoulder 52 about which annular sealing member 42 is disposed and which bears on rim 44. The top surface of upper portion 48 carries a thin liner 54, preferably formed of the same material as liner 34, and which has an annular skirt portion disposed about abutment shoulder 52. The skirt portion of liner 54 forms a fluid tight seal between the inner surfaces of stave sections 12 and bottom wall 18. As peripheral edge 46 of bottom wall 18 is introduced into croze 16, sealing member 42 is squeezed between shoulder 52 and recessed portion 40 to form a second liquid tight seal between the inner surface of body 10 and bottom wall 18.

Liners 34 and 54 preferably are applied to stave sections 12 and bottom wall 18 in flat sheet form and readily follow the contours of tongues 26 and 32, grooves 28 and 30, and abutment shoulder 52. However, the plastic liners can be formed into shape as extrusion units slip fitted over stave sections 12 and bottom wall 18, if desired.

Another form of wood tank or wood pipe construction, generally designated 60, is illustrated in FIG. 5 and comprises a plurality of elongated stave sections 62, each having an outer surface 64 and an inner surface 66. Each stave section 62 also is provided with a pair of opposite longitudinal edge faces 68 having longitudinal grooves 70 and 72, respectively.

The inner surface 66 and portions of the longitudinal edge faces 68 are covered with a thin flexible sheet of plastic material forming a liner 74 for each stave section 62. Liner 74 also is preferably formed of the same materials as liners 34 and 54. The corners formed between inner surface 66 and longitudinal edge faces 68 are rounded as at 76 to eliminate sharp bends to facilitate the stretching of liner 74 across inner surface 66 and along edge faces 68. Liner 74 terminates at opposite side portions 78 in grooves 70 and 72, respectively.

An elongated rigid key 80 of a generally elliptical shape in cross section and preferably formed of wood is partially received in groove 70 to secure one opposite side of liner 74 in place and to connect adjacent stave sections 64 together. The other side of liner 74 is secured in groove 72 by means of an elongated solid rod 82 having a flat side and preferably formed of wood, inserted in groove 72 with a press fit against liner 74. The flat side of rod 82 enables a punch or other hand tool to be applied to rod 82 for forcing the same into groove 72, while the curved surface of rod 82 eliminates sharp edges which might otherwise occur. The exposed portion of key 80 is adapted to seat in groove 72 of an adjacent stave section 62 against rod 82 pressing the latter as shown in FIG. 5. Thus, a plurality of stave sections 62 are secured together in a mating edge to edge relation with side portions 78 of liner 74 squeezed together to form a fluid tight seal between adjacent stave sections. The construction shown in FIG. 5 also is adapted for making flat wooden covers for use in conjunction with wood tank bodies.

From the foregoing, it is apparent that the objects of the present invention have been fully accomplished. As a result of this invention, an improved ligno-pipe hollow wood body is provided in which each stave section is covered across the inner surface and along the longitudinal edge faces thereof with a liner mechanically locked in position between the mating edges of adjacent stave sections. Also, a double sealing construction is provided between the inner side of the disposed bottom wall thereof. The hollow body structure can be readily transported in knocked down form or condition and easily assembled at the place of use.

Preferred embodiments of this invention having been disclosed in detail, it is to be understood that this has been done by way of illustration only.

Claim:

1. A lined hollow body comprising a plurality of longitudinal stave sections each having inner and outer surfaces and longitudinal edge faces, said longitudinal edge faces each having mating portions intermediate said inner and outer surfaces, a liner covering said inner surface of each of said stave sections and extending along said edge faces following the contours of said mating portions, means securing said stave sections together, said mating portions of adjacent stave sections securing portions of adjacent liners therebetween for forming a transverse croze formed in the inner surface thereof adjacent one end thereof, said crozes being aligned to form a continuous croze along the inner surface of the body, a bottom wall having a peripheral edge disposed in said continuous croze, said bottom wall having an annular shoulder inwardly of said peripheral edge and sealing means disposed between said annular shoulder and said inner surface of said body adjacent said continuous croze.

2. A lined hollow body according to claim 1 including a liner covering the inner surface of said bottom wall and having a peripheral portion extending over said annular shoulder and compressed between said shoulder and said sealing means.

3. A lined hollow body according to claim 1 wherein said mating portions of each edge face comprise a longitudinal tongue and a longitudinal groove adjacent said tongue.

4. A lined hollow body according to claim 1 wherein said mating portions of said edge faces comprise opposed longitudinal grooves together with a solid rod disposed in one of said opposed grooves and key means disposed in said opposed grooves and pressing said rod.

5. A lined hollow body comprising a plurality of longitudinal stave sections each having inner and outer surfaces and longitudinal edge faces, said longitudinal edge faces each having mating portions intermediate said inner and outer surfaces, a liner covering said inner surface of each of said stave sections and extending along said edge faces following the contours of said mating portions, means securing said stave sections together, said mating portions of adjacent stave sections securing portions of adjacent liners therebetween for locking said liners in position, each of said stave sections having a transverse croze formed in the inner surface thereof adjacent said croze being aligned to form a continuous croze along the inner surface of the body, each stave section being provided with a transverse, arcuately curved recessed portion adjacent to and above said croze, said recessed portions being aligned to form a continuous annular recess along the inner surface of said body, a bottom wall having a peripheral edge disposed in said continuous croze, said bottom wall having an annular shoulder inwardly of said peripheral edge, and sealing means disposed between said annular shoulder and said annular recess.

6. A lined hollow body according to claim 1 wherein said inner surface of said body is provided with an annular recess against which said sealing means is pressed.