

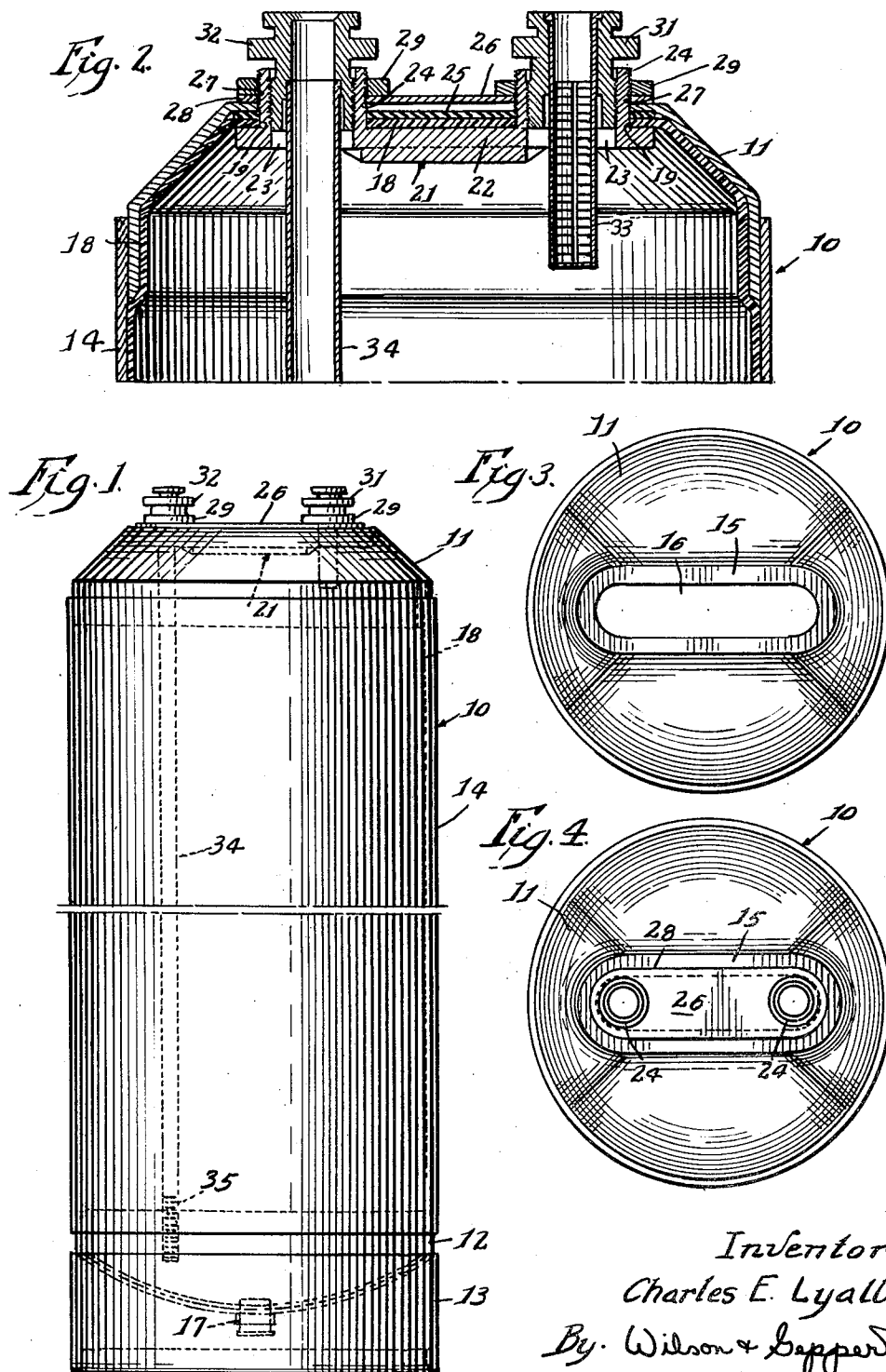
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WATER CONDITIONING TANK AND LINER

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WATER CONDITIONING TANK AND LINER

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The present invention relates to a novel water conditioning tank and more particularly to a lined tank where the liner may be easily inserted or removed from the tank through a central opening in the top of the tank.

A common problem in the water conditioning industry is the corrosion of the interior of the tanks due to an extended exposure of the interior surface to water; especially where highly corrosive conditions are present in the water supply. Even where a tank is zinc galvanized, corrosion may occur due to imperfections in the zinc coating or impurities in the metal, and many times the zinc coating on the steel tank will enhance and accelerate corrosion once it has begun.

Coating the interior surface of a tank with a resinous, asphaltic or thermoplastic material was also attempted but, here again, problems arose. Liners were also tried but expense was an important factor in producing a commercially acceptable product. The present invention relates to the use of a vinyl liner in a new tank construction which will reduce the cost of manufacture over previous lined tanks. The liner is in the form of a bag having a pair of spaced openings at one end for insertion of inlet and outlet manifolds into the tank. The liner cooperates with a yoke which is secured to the tank and is mounted in and seals the central opening in the top of the tank.

An important object of the present invention is the provision of a novel tank construction especially adapted for use with a tank liner. The tank is provided with an elongated central opening in the top thereof which is of a dimension to allow the utilization of inlet and outlet manifolds with adequate spacing therebetween. The central opening cooperates with a yoke and a bag-shaped liner to seal the tank except for spaced openings for the inlet and outlet manifolds.

Another object of the present invention is the provision of a thin liner which closely conforms to the internal configuration of the tank to provide a complete interior conformation of the liner against the wall of the tank. The liner is inserted into the tank through the slotted opening in the top of the tank and sealingly engages the tank adjacent the slotted opening. After the liner is inserted into the tank, the liner is blown out against the interior wall of the tank by air pressure, with the air between the tank wall and the liner escaping past a sealing gasket and through the slotted opening. Then the liner is sealed to the tank at the slotted opening.

A further object of the present invention is the provision of a tank yoke which is capable of being inserted into the liner and which has a pair of spaced threaded neck portions connected by a substantially flat, smooth sealing surface. The neck portions are adapted to project through the openings in the liner and through the slotted opening in the tank where the yoke is mounted onto the tank. The neck portions provide openings to receive suitable inlet and outlet fittings for the tank, and the yoke aids in sealing the liner in the tank.

Further objects are to provide a construction of maximum simplicity, efficiency, economy and ease of assembly, and such further objects, advantages and capabilities as will later more fully appear and are inherently possessed thereby.

In the drawing:

FIGURE 1 is a front elevational view of a water conditioning tank showing in dotted outline the liner in-

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serted therein and having suitable inlet and outlet manifolds secured to the yoke for the liner.

FIG. 2 is an enlarged vertical cross sectional view of the top portion of the tank and showing the liner, tank yoke and sealing means therefor.

FIG. 3 is a top plan view of the tank of FIG. 1 with the liner and yoke removed to show the slotted opening in the tank.

FIG. 4 is a top plan view of the tank similar to FIG. 3, but with the liner, yoke and cover plate included.

Referring more particularly to the drawing wherein is shown an illustrative embodiment of the present invention, FIG. 1 discloses a generally cylindrical tank 10 having a head or top member 11 and a bottom member 12 and a cylindrical depending side wall or supporting skirt 13. Both the top and bottom members or closures are press-fitted into a cylindrical side wall or shell 14 and welded or otherwise rigidly secured thereto, and the skirt 13 is rigidly secured to the bottom member 12. The top member has a generally flat upper surface 15 with a slotted or elongated opening 16 centrally located therein (see FIG. 3). A threaded plug 17 closes an opening in the bottom member 12.

A flexible bag-type liner 18, preferably formed of a suitable plastic material, is located in the tank 10 conformably engaging and contacting the interior wall of the tank shell 14, top member 11 and bottom member 12. The plastic utilized for the liner must be a non-toxic composition as the water conditioning units treat water for human consumption, and the plastic must not impart any taste or odor to the water. Although there are many suitable plastics and rubber components, the preferred plastic is a non-toxic, flexible polyvinyl chloride.

The liner 18 is formed from one or more pieces of a thin sheet of vinyl plastic; normally there would be a tubular side wall with a top and a bottom piece sealed to the side wall at each end. The top piece has a pair of spaced openings 19 adapted to accommodate the inlet and outlet manifolds of the tank. A yoke 21 consists of a generally flat plate 22 with spaced openings 23 aligned with the openings 19 in the liner 18. A pair of cylindrical internally and externally threaded projections 24 are formed to extend upward from the plate 22 and encompass the openings 23.

A resilient gasket 25, preferably of a natural or synthetic rubber, having a generally elliptical periphery is positioned between the liner 18 and the top 11 of the tank 10. The gasket 25 includes a pair of spaced openings which receive therein the cylindrical projections 24 on the yoke. The projections 24 extend through the openings 19 in the liner 18, the openings in the gasket 25 and through the slotted opening 16 in the top of the tank when the yoke 21 is in operative position. A cover plate 26 (FIGS. 2 and 4) has a pair of spaced openings 27 receiving the projections 24 of the yoke 21 and abuts the top of the tank 10 with the edges 28 of the cover plate extending beyond the opening 16 in the top surface 15 of the tank.

A pair of nuts 29 threadably engage the exterior threads on the projections 24 to clamp the yoke onto the tank and seal the liner within the tank. An inlet fitting 31 and an outlet fitting 32 threadably engage the interior threaded surfaces of the projections 24 and extend through the openings 22 in the yoke 21 into the interior of the liner 18 and the tank 10. The fittings 31 and 32 have suitable slip connections adapted to cooperate with connectors on the water lines in the home or industrial installation. The inlet fitting 31 has a removable short slotted inlet manifold 33 and the outlet fitting 32 has a permanently affixed long manifold 34 which extends to adjacent the bottom of the tank and terminates in a slotted portion 35 at the lower end.

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To assemble the liner 18 in a water conditioning tank 10, the yoke 21 is inserted into the resilient or flexible liner 18 through one of the openings 19, the opening deforming sufficiently to receive the yoke, and the projections 24 are extended through the openings 19. The gasket 25 is then assembled onto the yoke and abutting the exterior of the liner. The liner, yoke, and gasket are then inserted into the tank 10 through the slotted opening 16 and the projections 24 of the yoke 21 are positioned to extend upward through the opening 16. Holding the yoke 21 in position, the cover plate 26 is placed over the projections to abut the top surface 15 of the tank and the nuts 29 are partially threaded onto the projections.

Air pressure is then applied through the openings 23 in the yoke 21 to blow the liner 18 out against the interior wall of the tank. Air which is between the exterior of the liner and the interior of the tank escapes past the gasket 25 and through the slotted opening 16 in the tank when the air pressure is exerted on the interior of the liner. Once the liner 18 has been formed to the tank interior geometry, then the nuts are tightened on the yoke to effect a seal between the liner 18, gasket 25 and the tank 10. The inlet and outlet fittings 31 and 32 are then secured in the projections 24 and the tank is ready to be filled for service operation.

While the improvement has been shown and described as being advantageously applicable to a water conditioning tank, it is not my desire or intent to unnecessarily limit the scope or the utility of the improved features by virtue of this illustrative embodiment.

Having thus disclosed the invention, I claim:

1. A hollow tank and liner combination, comprising a cylindrical tank having a top and bottom closure with a bottom supporting member and a slotted opening centrally located in the top closure of the tank, a flexible removable plastic liner conformably fitting within the tank and having spaced openings at one end thereof, a yoke positioned within the liner in the tank, said yoke including a generally flat plate and a pair of spaced threaded projections extending through the openings in the liner and through the slotted opening of the top closure, said projections defining a pair of spaced openings adapted to receive suitable fittings for the tank, a sealing gasket mounted between the liner and the top closure to seal the liner in the tank and seal said opening, a cover plate fitting over said projections at the exterior of the tank and extending beyond the slotted opening, and a pair of nuts

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threadingly engaging the projections to seal and secure the yoke and liner in the tank.

2. A hollow tank and liner combination as set forth in claim 1, in which said yoke has a periphery extending outwardly beyond the slotted opening in the tank.

3. A hollow tank and liner combination, comprising a cylindrical tank having a top and bottom closure, said top closure having a centrally located flat elongated upper surface with an elongated opening therein, a flexible removable plastic liner conformably fitting within the tank and having spaced openings therein, a yoke adapted to be inserted in the liner and having an elongated plate and spaced projections extending upward from the plate and having passages therethrough and extending through the plate, said projections extending through said elongated opening, a cover plate fitting over said projections at the exterior of the tank and closing said elongated opening, and means clamping said yoke and cover plate onto said tank.

4. A hollow tank and liner combination, comprising a cylindrical tank having a top and bottom closure, said top closure providing a centrally positioned flat elongated upper surface having an elongated opening therein, a flexible removable one-piece plastic liner conformably fitting against the interior surface of said tank and having spaced openings at its upper end, an elongated yoke adapted to be inserted into said liner including a generally flat plate having its periphery extending outwardly beyond the periphery of said elongated opening and having spaced threaded projections extending through the openings in the liner and the elongated opening in the tank, said projections having passages extending therethrough and through the flat plate, an elongated sealing gasket having spaced openings therein aligned with said projections and being sandwiched between the tank and the liner, an elongated cover plate extending outwardly beyond the elongated opening and having spaced openings aligned with and receiving said projections, said cover plate being located on the exterior of the flat elongated upper surface of said top closure, and internally threaded nuts threadingly engaging the projections above said cover plate to seal and secure the yoke and liner in the tank.

References Cited in the file of this patent

UNITED STATES PATENTS

1,903,012	Rosenblueth	Mar. 28, 1933
2,283,066	Ingersoll	May 12, 1942
2,721,674	Lazard	Oct. 25, 1955