

Oct. 19, 1943.

W. G. MARTIN

2,332,454

WELDED JOINT FOR HOT WATER TANKS

Filed Nov. 21, 1941

FIG. 1.

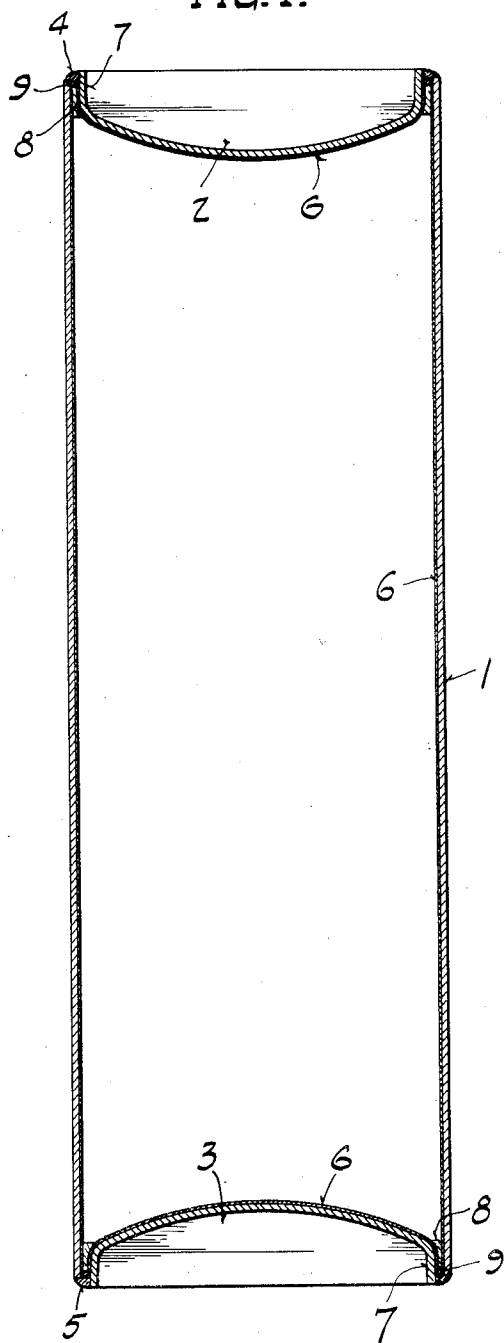


FIG. 2.

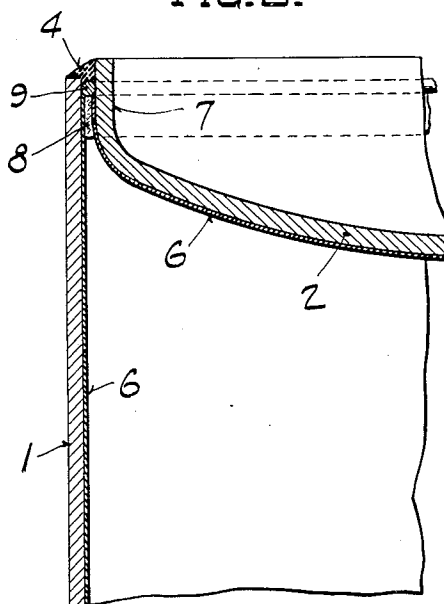
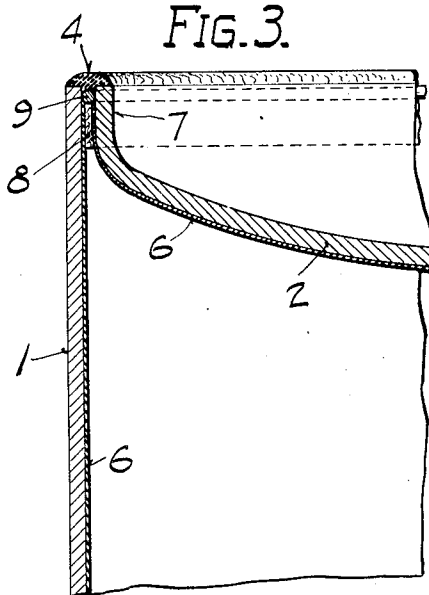


FIG. 3.



Wesley G. Martin
INVENTOR.

BY *Elwin C. Andrews*
ATTORNEY.

UNITED STATES PATENT OFFICE

2,332,454

WELDED JOINT FOR HOT WATER TANKS

Wesley G. Martin, Milwaukee, Wis., assignor to
A. O. Smith Corporation, Milwaukee, Wis., a
corporation of New York

Application November 21, 1941, Serial No. 419,902

4 Claims. (Cl. 220-67)

This invention relates to hot water tank construction and more particularly to the joining together of the heads and shell of a hot water tank which parts are lined with a protective corrosion resistant material such as ceramic enamel or galvanizing to prevent corrosion while in service.

The main object of the present invention is to provide a durable joint between the head and shell of a hot water tank by a novel attachment of the head to the shell.

Other objects will become apparent from the accompanying drawing and following description illustrating an embodiment of the invention.

In the drawing:

Figure 1 is a longitudinal section through a hot water tank;

Fig. 2 is an enlarged section through a joint between the upper head and body of a tank; and

Fig. 3 is a section similar to Fig. 2 of a modified form of the invention.

Referring to the drawing, there is illustrated a hot water storage tank having a generally cylindrical shell 1 and an upper head 2 and a lower head 3.

The heads 2 and 3 are each respectively disposed at opposite ends of the shell 1 to provide the circumferentially welded joints 4 and 5 when the heads are welded to the shell upon assembly.

The shell 1 and heads 2 and 3 are made of any suitable metal. The shell is cylindrical throughout its entire extent and the heads are preferably concave.

The interior surfaces of the shell 1 and the heads 2 and 3 are lined with a protective material, such as ceramic enamel 6 or galvanizing, to protect them from corrosion by fluids contained within the tank. The ceramic enamel lining 6 is preferably employed and it is applied and fused to the interior surfaces of the heads and shell prior to assembly. If galvanizing is utilized it likewise is applied before assembly of the tank.

Suitable openings, not shown, may be provided in the tank for any desired connections and attachments.

The joints 4 and 5 in the hot water tank illustrated are preferably similar. The description hereafter is therefore confined to the joining of the head 2 to the shell 1.

In manufacturing the head 2 into a concave structure, the skirt 7 of the head 2 is formed in-

to a substantially cylindrical shape. In assembling the head and shell the skirt 7 of the head 2 is inserted inside the end of the shell. In this manner of assembly the interior surfaces of the shell 1 overlie the outer surfaces of the cylindrical skirt 7 of the head 2 for a substantial area.

In the preferred embodiment illustrated the skirt of the head 2 protrudes outwardly a short distance farther than the end of the shell 1 to provide an angular seat into which the weld metal of the joint 4 may be deposited. In the modified embodiment illustrated by Fig. 3 the end of the head 2 extends co-extensively with the end of the shell 1 and no angular seat for the deposit of weld metal is formed. The shell may also protrude a short distance beyond the skirt of head 2 to provide an angular seat for weld deposit 4.

To prevent injury to the joint 4 by the circulation of fluid to the weld metal deposited at the joint, a gasket 8 is preferably disposed, in both the embodiments illustrated, in the area between the interior surface of the shell 1 and the outer surface of the skirt 7 of the head 2. The outer end of the gasket 8 is removed from the end of the shell 1 a slight distance in both embodiments.

The gasket 8 is corrosion resistant and also heat resistant in quality, such as an asbestos or glass fiber gasket or rubber or plastic composition. It is of a substantial thickness and may be employed in hot water tanks having either a ceramic enamel or galvanized lining.

In addition to preventing circulation of fluid to the welded joint 4, the gasket 8 protects the respective linings of the shell 1 and the head 2 from injury during assembly as it separates the linings of each part which would ordinarily contact each other when the head 2 is inserted within one end of the shell 1.

A relatively small sized metallic ring or wire 9 is disposed over the outer end of the gasket 8 between the interior surface of the shell 1 and the outer surface of the skirt 7 of the head 2. The metallic ring 9 is preferably of corrosion resistant metal or alloy such as a chromium alloy steel and is employed in both of the embodiments illustrated. With the ring 9 in this position the head 2 and the shell 1 are welded together at the joint 4 by the deposit of weld metal to seal the tank against leakage from within.

In the preferred embodiment the weld metal at the joint 4 is deposited by an electric arc in the angular seat formed in assembling the tank

by extending the skirt of the head a short distance outwardly from the end of the shell. In the modified form the weld metal at the joint 4 is deposited on the respective ends of the head 2 and the shell 1 to seal the tank against leakage, or the end edges of the head and shell and the ring 9 may be melted and fused together by an electric carbon arc without the deposition of additional weld metal.

The ring 9 effectively protects the gasket 8 disposed between the head 2 and the shell 1 from injury by the heat of the welding arc. It also prevents inclusions in the weld metal deposited at the joint 4 from the gasket 8 should the gasket be melted by the welding arc. The ring 9 becomes fused with the weld metal and forms a part of the joint.

In manufacturing the hot water tank illustrated the shell of the tank is rolled from sheet metal into a generally cylindrical shape and then welded along its longitudinally extending seam.

The heads are next formed into a concave shape with the skirt portions thereof extending straightly in a substantially cylindrical shape similar to that of the shell.

The interior surfaces of the heads and shell are then preferably sprayed with a ceramic enamel material and fused by heat to protect the interior of the tank from corrosion by the fluids contained therein while the tank is in service. The interior surfaces covered with the ceramic material include the opposed surfaces of the shell and heads.

In the next operation heat and corrosion resistant gaskets 8 are assembled on the substantially cylindrical skirts of the heads while the heads are forced into place. In the preferred embodiment this locates the edges of the heads a short distance outwardly from the ends of the shell. In the modified embodiment the edges of the heads are disposed co-extensively with the ends of the shell. In either case the edges of the heads may be said to be adjacent the respective end edges of the shell. The forcing of the heads into the ends of the shell compresses the gaskets between the interior surfaces of the shell 1 and the outer surfaces of the cylindrical skirts of the heads at positions slightly removed from the respective edges of the shell and the heads. The rings 9 are next applied and the circumferential welds 4 and 5 are made to seal the joints between the heads and shell.

The gaskets keep the liquids within the tank from circulating in contact with the exposed areas in and near the respective welds. The gaskets are particularly effective in retarding the flow of contained liquids to the joints 4 and 5 due to their substantial extent in the considerable area in which the shell overlies the relatively cylindrical skirts of the heads. The gaskets also fill up any irregularities in the linings of the heads and shell in the region where the latter meet as well as substantially eliminating the problem of manufacturing tolerances as to the relative dimensions of the heads and shell.

In turn the wire rings 9 disposed over the ends of the gaskets between the respective heads and ends of the shell protect the gaskets from the direct action of the welding arc and prevent the consequent melting and forming of inclusions in the weld deposit.

The structure made by the invention in the manner described provides a hot water tank with joints of very superior quality. The welding of the joints seals the tank in the region of the joints against leakage, and injury to the weld metal by corrosion from the fluid contained in the tank is prevented by employment of the gaskets. The wire ring disposed over the outer ends of the gaskets insures that the gaskets will not be injured by the heat of the welding arc and provides a base for receiving the arc deposited weld metal.

Various embodiments of the invention may be employed within the scope of the accompanying claims.

I claim:

1. In a hot water storage tank, a head interiorly lined to protect the same from corrosion and having a substantially cylindrical skirt, a shell similarly lined, a weld joining said head and shell together, a corrosion resistant member disposed between the meeting surfaces of the shell and head to prevent circulation of fluid to the weld, and a corrosion resistant metallic ring member secured in said welded joint at the outer end of said corrosion resistant member.

2. A hot water storage tank or similar structure, comprising a head interiorly lined to protect the same from corrosion and having a substantially cylindrical skirt, a shell similarly lined, the interior surface at one end of the shell being juxtaposed to the outer surface of the said skirt for a substantial overlapping area, a corrosion resistant member of substantial thickness provided between the said skirt and opposing surface of the shell, a metallic ring member disposed at the outer end of said member, and a circumferential weld fusing said ring member and the edges of the head and shell together.

3. A hot water storage tank or similar structure, comprising a concave head interiorly coated with a ceramic enamel lining to protect the same from corrosion and having a cylindrical skirt, a shell similarly lined, the interior lined surface at one end of the shell being juxtaposed to the outer lined surface of the said skirt for a substantial overlapping area, a corrosion resistant member of substantial thickness provided between said skirt and the opposing surface of the shell, a metallic wire ring disposed at the outer end of said member, and a circumferential weld fusing said ring and the adjacent edges of the head and shell together to complete the joint.

4. A hot water storage tank or similar structure, comprising a concave head interiorly coated with a ceramic enamel lining to protect the same from corrosion and having a substantially cylindrical skirt, a shell similarly lined, the interior lined surface of one end of the shell being juxtaposed to the outer lined surface of the said skirt for a substantial overlapping area and with the end of the skirt extending outwardly a slight distance from the end of the shell to form an angular seat, a corrosion resistant gasket of substantial thickness provided between the said skirt and the opposing surface of the shell, a metallic wire ring disposed between the outer end of the said gasket and said angular seat, and a deposit of weld metal in said angular seat to seal the tank at the joint between the head and shell.

WESLEY G. MARTIN.