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CORROSION-RESISTANT FLUID CONTAINER

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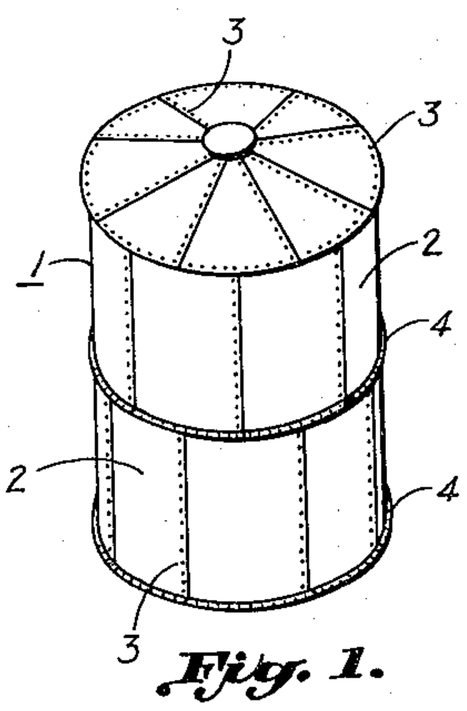

Fig. 1.

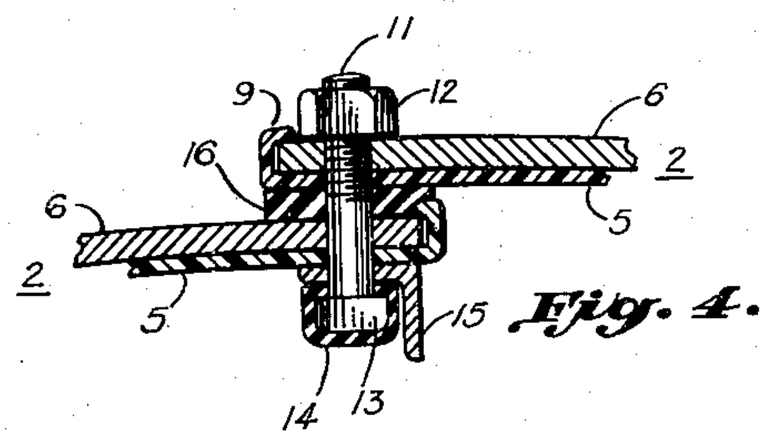

Fig. 4.

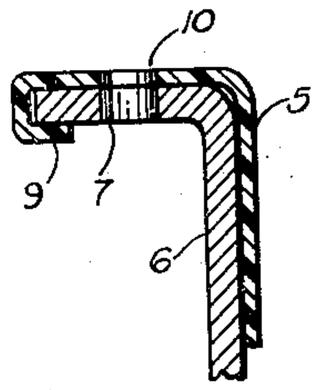

Fig. 3

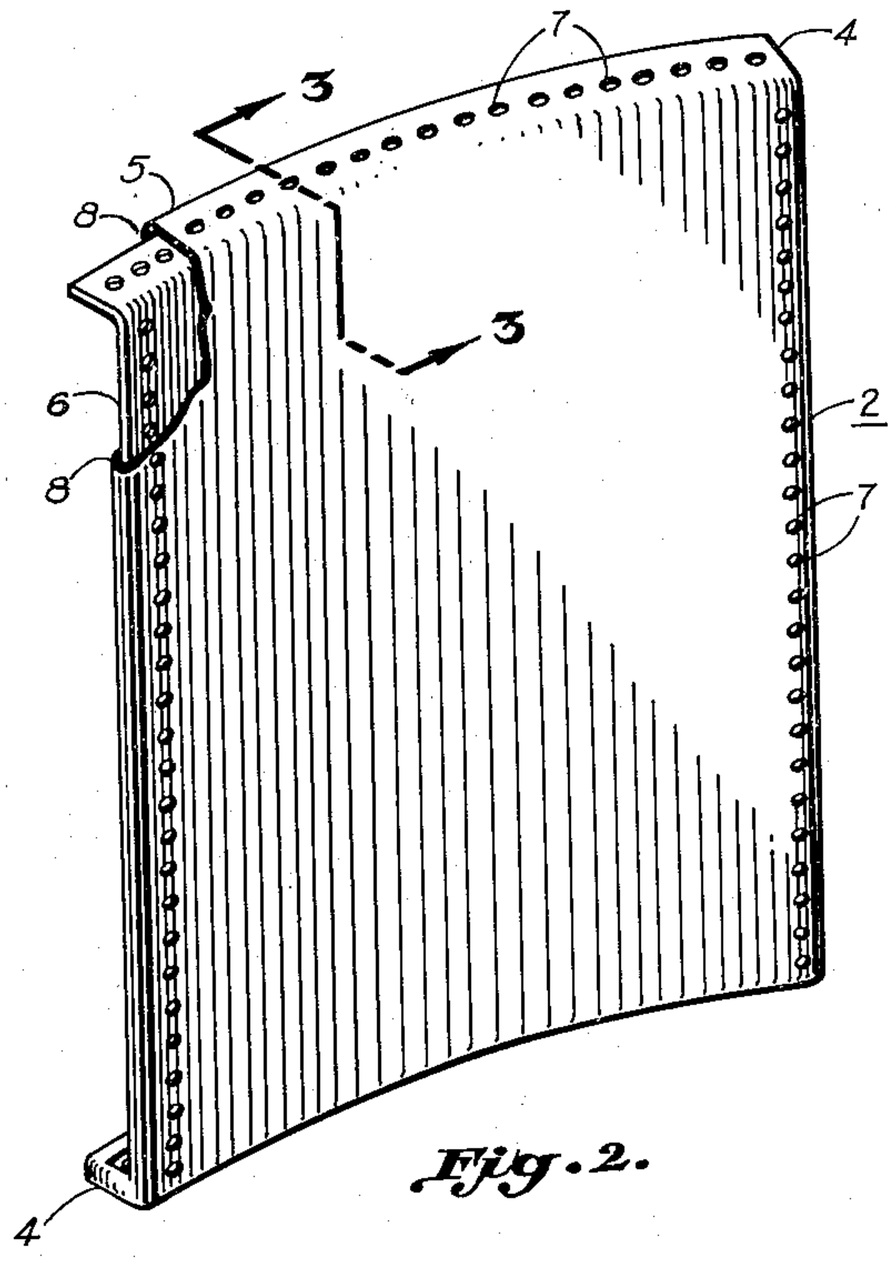

Fig. 2.

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CORROSION-RESISTANT FLUID CONTAINER

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1 Claim. (Cl. 220—5)

The present invention relates to enclosures, or containers, for fluids of a corrosive nature. More particularly, the invention relates to means for protecting the internal surfaces of an enclosure from attack by corrosive fluids.

In the oil fields steel is usually used to make containers, or tanks, to hold corrosive petroleum or water. Wood and plastic have been used for construction of these vessels, but various factors dictate the more general usage of steel. Certain types of steel are available which will resist the corrosive properties of a wide variety of fluids, including those in the oil fields. However, these types of steel are usually quite expensive and correspondingly uneconomical for tank construction. Therefore, there is clearly a problem of providing a combination of materials, and an arrangement which will have sufficient strength to contain large amounts of corrosive fluids, resist the corrosive properties of the fluids and yet compare economically to containers made of corrodible steel.

Metallic tanks and other containers employ both welded and bolted constructions to join prefabricated panels together in forming the unitary vessel. The bolted construction has the distinct advantage of enabling the parts for a relatively large container to be individually fabricated in a shop, transported to an erection site and assembled into the completed vessel with relatively unskilled labor. It is with the form of the panels, and resulting containers, of this patricular construction with which the present invention is concerned.

This invention contemplates the erection, or construction, of a tank, container or conduit in which prefabricated plates, or panels, are fastened together in erection of the vessel. Flexible and preformed coverings of corrosion-resistant material are sized so one covering may be readily placed about each panel in an arrangement which produces a container in which only the material of the coverings is exposed to corrosive fluids therein.

The invention further contemplates that the coverings of corrosion-resistant material will be so sized and shaped that when arranged on their respective plates they will permit the plates to be joined to each other in the usual manner with simple fastenings. Further, the shape and arrangement of the material may co-operate with gasket material at the juncture seam between plates so as to add to the efficiency of fluid sealing at that point. It is further contemplated that the coverings may be so sized and arranged as to function, themselves, as gaskets in the juncture seals between plates, obviating the need for additional gasket structure.

An object of the present invention is to provide a

manually insertable, continuous and unbroken, barrier between a corrosive fluid agent and the internal surfaces of a container for the fluid as a part of the construction of the container.

Another object of the present invention is to provide a unitary protective covering for a body of structural material which can be readily placed about the body with simple, manual, operations.

A further object of the invention is to provide a unitary protective covering for each panel of a container or enclosure, which can be placed about the panels as a step in assembly of the panels into the container, or enclosure.

A further object of the invention is to contain fluids of corrosive properties with an enclosure erected with panel sections, having corners formed with adjacent edges joining at relatively sharp angles, and made of material corrodible by the fluids, by providing a unitary, moldable, flexible, unbroken, protective covering for each section which can be placed about the panel prior to fastening all panels together to form the fluid containing enclosure in which the corrosive fluids do not come into contact with the material of the panel sections.

A further object of the invention is to provide unitary protective coverings for each panel of a container, or enclosure, which can be arranged about the panels in such a way as to permit bolt and nut combinations to be utilized in fastening the panels together at their edges to form the fluid-containing enclosure.

Another object of the invention is to provide a unitary protective covering for a body of structural material in an arrangement which will simultaneously function as a complete barrier to corrosive fluids within a container formed by the panels and to act as a gasket at the point of juncture between the panels.

In the drawings:

Fig. 1 is a perspective illustration of a tank constructed in accordance with the invention;

Fig. 2 is an elevation in perspective of one of the panel sections of the tank of Fig. 1 with a section of its protective covering broken away to show its relationship to the body of the panel;

Fig. 3 is a cross-section in elevation of an edge of the panel of Fig. 2 along the lines 3—3;

Fig. 4 is an elevated cross-section of a representative joint between the panels of the tank of Fig. 1.

Referring specifically to Fig. 1, a cylindrical tank 1 is used to represent enclosures, containers, or vessels, of various shapes and sizes which use the invention. As illustrated, tank 1 may be used to store fluids, or collect fluids from a number of sources for redistribution. Additionally, the tank 1 may be used to measure the quantity of fluids stored or collected therein. The purpose of the tank is incidental to the present invention, directed as it is to the problem of completely protecting the material of the body of the tank panels from the corrosive action of fluids that may be placed within the tank.

Fig. 1 makes it readily apparent that cylindrical tank 1 is erected by joining together prefabricated panels 2. Panels 2 are illustrated as bolted to each other, at their edges, by rows 3 of bolt-nut combinations. Each of the panels 2 may be preformed in shop operations as a part of the cylindrical tanks they will become in order that their bolt holes will properly align with each other when

the tank is erected in the field. Relatively unskilled personnel may be utilized to pass bolt-nut combinations, as simple fastening means, through the aligned holes on the edges of adjacent panels 2. Fig. 4 gives an illustration of how panels 2 are joined together in a simple overlapping seam in the hoop direction. Chimes 4 are utilized in the vertical direction to form the necessary juncture seam.

Fig. 2 illustrates one of the cylindrical segment side panels 2 in an elevated perspective to reveal the details of its construction in accordance with the invention. As illustrated in Fig. 1, tank 1 appears to be an ordinary, bolted, tank for receiving liquids. However, the remaining figures illustrate the structure which enables the tank, or enclosure to contain fluids of a highly corrosive nature without destroying, or deteriorating, corrodible metal when used as the body of panel-plates 2.

As illustrated in Fig. 2, the present invention contemplates the provision of a unitary, moldable, flexible protective covering 5 for the body 6 of panel 2. Body 6 is prefabricated of economical, but corrodible, metal in a shop for ready combination with other panels in forming tank 1. Chimes 4 are formed thereon, the flat plate shape of the body 6 is given the desired arcuate formation in the hoop direction of the tank and bolt holes 7 are arranged in rows 3 for receiving the simple fastening means therethrough.

Over the preformed body 6 of panel 2 there is arranged the covering 5 of a flexible material which is impervious and chemically resistant to fluids to be contained by the tank. This covering is preferably molded of one of the plastic materials which will provide the desired imperviousness and chemical resistivity while retaining sufficient flexibility to cling and conform to the contours of body 6. This close conformance to the contours of body 6 has been illustrated by showing a corner of the material 5 as broken away at 8. The general arrangement of the covering about the body 6 can be gathered from Fig. 2. Additional features of this combination of the body and covering structures can be gathered from Fig. 3.

Fig. 3 is a view taken along 3—3 of Fig. 2 to show, in cross-section, how the covering 5 is molded with a lip 9 which is led around and over the edge, and corners formed of adjacent edges joining at relatively sharp angles, of body 6. It can be appreciated that the unitary covering for each body 6 is molded to a size which will permit relatively easy manual placement of the covering article over body 6 and yet remain thereon by the gripping provided by turned-over lips 9 on the edges and sharp corners of the covering 5. Body 6, in Fig. 3 is a portion of the tank 1 cylinder with an outwardly extending flange from each arcuate end of the portion. The unitary covering for each body 6 has a preformed shape which generally follows the shape given body 6 and which has outwardly extending flanges which cover the plate flanges. Further, the free ends of the flanges and body of the covering have a reversely bent continuous lip 9 which grippingly engages the free edges of the body 6 to maintain the covering mounted on the body.

Additionally, from Fig. 3, it can be appreciated that holes 10 in covering 5 can be formed, or cut, in the material of covering 5 to align with holes 7 in the edges of panel material 6. These holes 10 could be preformed in covering 5 or cut therein by some form of punch after covering 5 had been arranged about body 6.

The combination of body 6, preformed of material which renders the plate 2 structurally rigid and facilitates its incorporation with similar plates into the complete tank 1, can now be appreciated as entering into a combination with the covering 5 of flexible material which is impervious and chemically resistant to fluids contained by the tank while arranged as a unitary and removable article about the plate 6 so as to present a continuous and unbroken surface of the material of covering 5 to completely seal the fluid against contact with the body 6

without need for bonding between adjacent coverings 5. To more fully illustrate the structure of a junction between plates 2, Fig. 4 is provided. The illustration of Fig. 4 makes the arrangement clear as to how the plates 2 are simply arranged to overlap in order that their holes will align and permit bolt 11 to be passed through them. A nut 12 is provided on the bolt with which to draw the plates 2 together, with at least a part of one of their coverings therebetween, in forming a leak-proof junction. The turned-over lips 9 of the coverings 5 are preferably terminated short of the bolt holes. However, it may be desirable that the lips be extended past the bolt holes, with only the minor complication of properly aligning preformed holes in the material of covering 5 on both sides of holes 7.

In drawing up bolt 11 with nut 12, head 13 presents a problem in that the material of bolt 11 might be attacked by the corrosive fluid of the tank and the edges of the head might well rip the material of covering 5. Therefore, it is desirable to either make bolt 11 of a material which will resist the corrosive characteristics of the tank fluids or provide a barrier between the bolt and fluid by means of a covering 14. This covering 14 may be of plastic material similar to that selected for covering 5. Further, to prevent a high unit loading stress between the underside of the bolt head 13 and the material of cover 5, angle 15 of non-corrodible material is provided in order to present a larger bearing surface against the covering 5. If desirable, this back-up member 15 could be made of corrodible material and covered with plastic as bolt head 13 is shown.

Seal of the joint of Fig. 4 against fluid leakage can be obtained by use of a gasket 16 between the joined edges of panels 2. It is additionally contemplated by the invention that the material of covering 5 be of sufficient thickness to act as a gasket material itself while simultaneously providing a barrier between the tank fluid and the material of body 6. With either arrangement, the result is a readily obtained sealing function to prevent fluid loss at the juncture of the panels 2.

From the foregoing it will be seen that this invention is one well adapted to attain all of the ends and objects hereinabove set forth, together with other advantages which are obvious and which are inherent to the apparatus.

It will be understood that certain features and subcombinations are of utility and may be employed without reference to other features and subcombinations. This is contemplated by and is within the scope of the claims.

As many possible embodiments may be made of the invention without departing from the scope thereof, it is to be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

The invention having been described, what is claimed is:

A prefabricated plate with which to form a cylindrical tank for fluids including;

a body of structurally rigid material with,

a main section in the form of a cylinder portion,

and a flange extending outwardly from each arcuate end of the main section;

a covering of flexible material which is impervious and chemically resistant to fluids to be contained by the tank when mounted on the body as a liner for the tank and having,

a main section preformed to correspond in shape to the main section of the body,

flanges corresponding in shape to the body flanges and extending outwardly to cover the body flanges,

and a reversely bent continuous lip on the free edges of the main section and flanges, which lip grippingly engages the free edges of the body and the free edges of the body flanges respectively;

and apertures extending through the free edges of the main section and the flanges of the body and the covering mounted thereon to receive fastening means for joining similar plates in the fixed relation required to form the tank with the coverings of the plates on the interior of the tank.

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