May 12, 1953 L. W. WILLIAMS 2,638,338

CORROSION INHIBITING VESSEL CONSTRUCTION

Filed Nov. 18, 1948

FIG. 1.

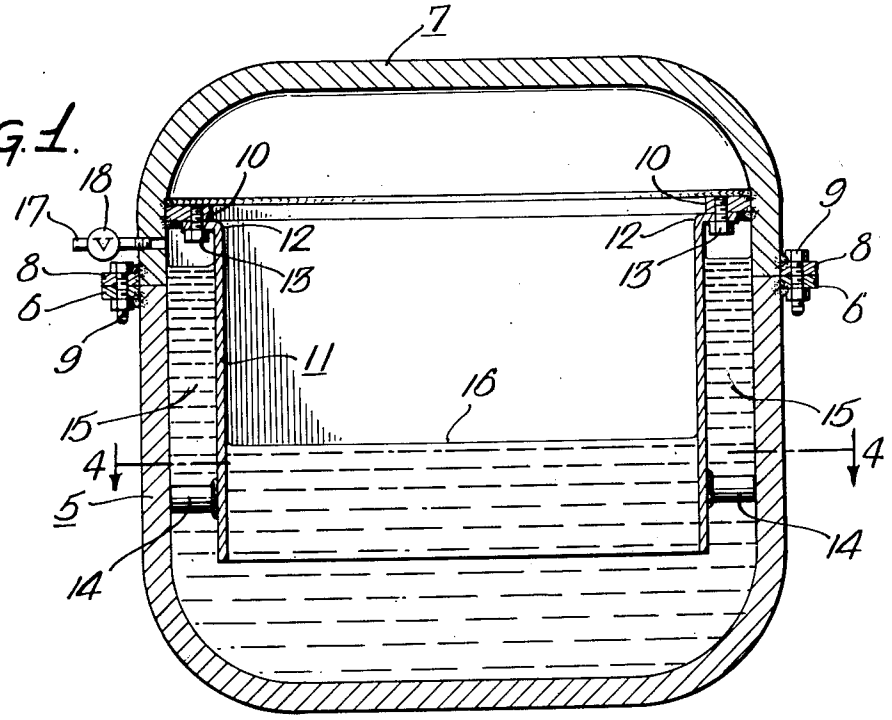


FIG. 2.

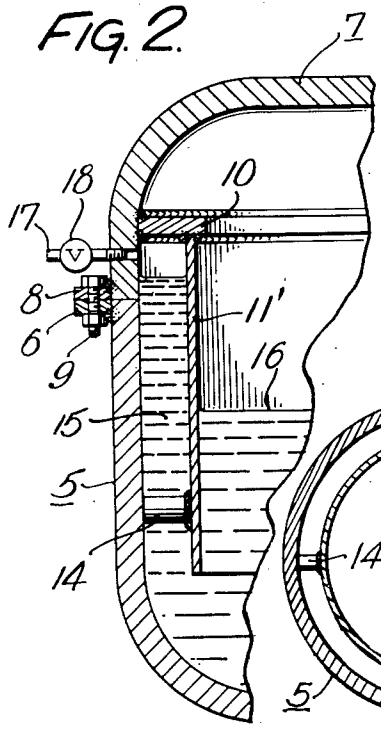


FIG. 3.

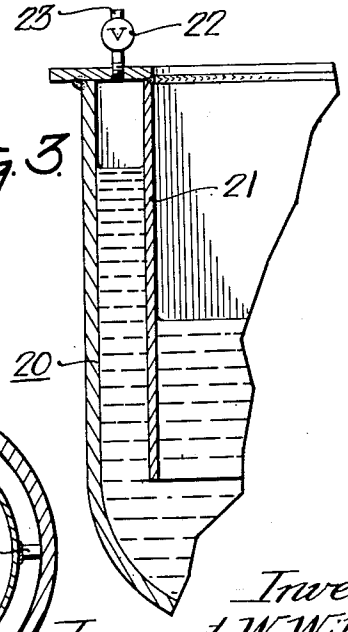
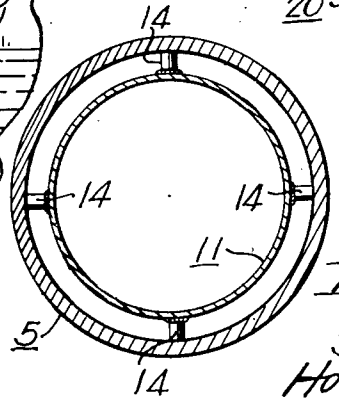


FIG. 4.



Inventor:
Leonard W. Williams
by his Attorneys
Howson & Howson

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CORROSION INHIBITING VESSEL CONSTRUCTION

Leonard W. Williams, Birchrunville, Pa., assignor to Lukens Steel Company, Coatesville, Pa., a corporation of Pennsylvania

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4 Claims. (Cl. 266—39)

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This invention relates to an improved construction for vessels and is directed particularly to means for reducing corrosion of melting pots and heat treating bath containers. The construction is also advantageously used on vessels for chemical processes and storage tanks for corrosive liquids.

The repair or replacement of the above types of vessels has been found to be an expensive procedure, both from the standpoint of cost of the replacement as well as the loss of time involved in effecting the repairs. The present invention reduces corrosive action on the walls of the melting vessel to a minimum and also includes the provision of structure in which any corrosive action that takes place affects only a part that may be renewed without disturbing the entire vessel.

A primary object of the invention therefore, is to provide a rigid lining for a vessel in which the corrosive liquid may be maintained at a higher level between the lining and the walls of the vessel than may always be the case in the body of the vessel proper.

A further object of the invention is to provide a lined vessel construction in which all parts subject to corrosive action may be readily and inexpensively replaced without renewing the body of the vessel.

Further objects will be apparent from the specification and drawings in which:

This vessel may be fabricated from any metal or combination of metals.

Fig. 1 is a sectional view showing an enclosed pressure kettle constructed in accordance with the invention;

Fig. 2 is a fragmentary sectional view similar to Fig. 1, showing a modified support for the liner;

Fig. 3 is a fragmentary sectional view illustrating the invention as applied to a melting pot; and

Fig. 4 is a transverse sectional view as seen at 4—4 of Fig. 1.

The kettle comprises a lower body 5. The rim of body 5 has an annular flange 6 welded or cast thereto, the flange being adapted to receive a cover 7 having a cooperating flange 8. When the cover is in the closed position of Fig. 1, a tight seal is provided by means of bolts 9, 9. The inside of cover 7 has an annular rim 10 welded or cast around the inner circumference thereof and somewhat above the lower edge of the cover. Rim 10 is adapted to support a sleeve-like liner 11 which is flared at 12 and bolted to rim 10 by means of cap screws 13, 13. Liner 11 extends down into body 5 and may, if desired, have radially

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extending feet 14, 14 adapted to space the liner from the inside wall of body 5. The liner 11 terminates above the bottom of body 5 so that there will be free fluid passage around the bottom of the liner into the annular space 15 between the liner and the walls of body 5.

Liquid 16 is introduced into the kettle through any convenient conduit (not shown) and the liquid level is raised until annular space 15 has been substantially filled. Pipe 17 and valve 18 provide a suitable vent for this purpose. When space 15 is filled, valve 18 is closed manually, or automatically in the event that it be a check valve, and the kettle is then ready for use. The corrosive action that may occur on the walls of the vessel is restricted to the inner surface of cover 7, the top face of flange 10, and the inside surface of liner 11 as shown in Fig. 1. It is well known that the corrosive action that is most harmful to the walls of the kettle takes place in the presence of air or a similar oxidizing gas so that by confining the air space to the cover and to the liner, or by producing a non-oxidizing condition in the space between the liner and the shell, it is possible to prolong the life of the body of the kettle more or less indefinitely.

The construction is also adapted to the introduction of an inert gas through conduit 17 after all the air has been exhausted in the event that the size or other features render this expedient desirable. Legs 14 serve to position the liner in place at all times, thus preventing any restriction of the free liquid flow around the bottom of the liner 11. It will be noted in the construction of Fig. 1 that the cover 7 may be quickly removed from body 5 by disconnecting bolts 9. In addition, the liner 11 may be removed from the cover by means of cap screws 13 so that it is not always necessary to replace both the liner and the cover.

The embodiment of Fig. 2 contemplates an integral welded or cast construction for the liner and the cover, and shows the liner 11' welded or cast to the underside of rim 10 rather than removably attached thereto.

Fig. 3 illustrates a modification which is primarily adapted for open vessels such as melting pots or heat treating baths and contemplates the introduction of an inert non-oxidizing gas to the annular space between the wall of the pot body 20 and the liner 21. It will be understood that the precise construction and manner of use is dependent on the operating conditions, the material to be used in construction, and upon the cost of replacing the vessel, as well as the cost

of supplying an inert gas to the body. In the structure of Fig. 3 for example, I have found that greatly improved results can be obtained simply by the use of a check valve 22 in conduit 23. When the pot body 20 is filled with liquid, air between the liner 21 and the body is automatically expelled from conduit 23. Check valve 22 prevents air from re-entering the space between the body 20 and the liner 21. The small quantity of oxygen remaining between the liner and the body is frequently insufficient to cause serious corrosion, or may be absorbed by the liquid itself. Thus, even the relatively simple construction of Fig. 3 greatly prolongs the life of a melting pot.

Additional cause for frequent replacement of vessels such as described herein, comes from erosion of the walls due to the frequent rise and fall of the liquid in the body. By providing a sealed annular chamber between the liner and the wall, I greatly reduce the area over which this erosion takes place or alternatively, in the forms of Figs. 1 and 2, I confine the erosion to a relatively simple and inexpensive part to replace.

Having thus described my invention, I claim:

I claim:

1. A high temperature vessel comprising a liquid containing body member; a lid for said body member, means for securing the lid to the body member in liquid and pressure-tight sealing relation thereto, an annular rigid liner depending from and secured to the interior of said lid, the outside of said liner being circular and of substantially smaller diameter than the inside of the body member, to provide a smooth annular concentric space between the liner and the body member, and a vent for the gas entrapped in the annular space between the liner and the body member.

2. Apparatus in accordance with claim 1, in which the liner is detachably secured to the lid.

3. Apparatus in accordance with claim 1, in which the liner is formed integrally with the inside of the lid.

4. A high temperature vessel comprising a liquid containing body member; a lid for said body member, means for securing the lid to the body member in liquid and pressure-tight sealing relation thereto, a rigid bottomless liner for said body member, all points on the periphery of said liner being substantially equidistant from the walls of the body member to provide a smooth space between the liner and the body member, said liner being substantially co-extensive with the vertical walls of the body member but terminating above the bottom of the body member a distance sufficient to provide unrestricted liquid flow between said smooth space and the interior of the liner, a pressure-tight rigid connection between the top of the liner and the top of the body member, and means for preventing radial expansion of the liner with respect to the body member including a plurality of radially extending legs secured to the outer periphery of the liner and positioned to abut the inner wall of the body member.

LEONARD W. WILLIAMS.

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