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APPARATUS FOR SEALING AN ANODE CONNECTION
AND METHOD THEREFOR
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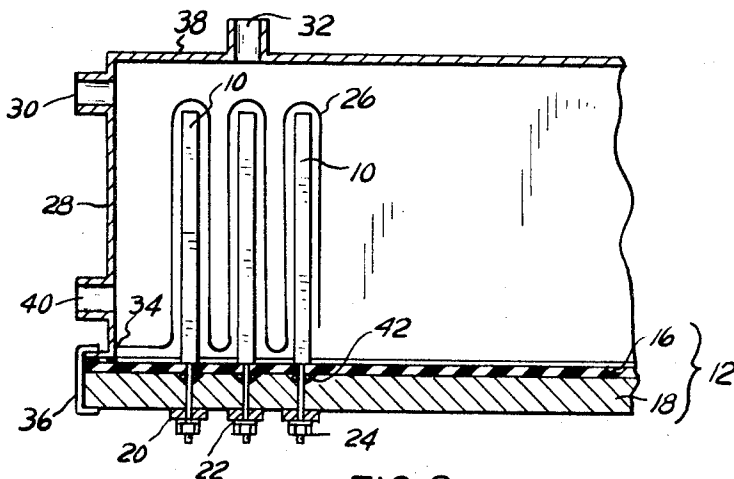


FIG. 2

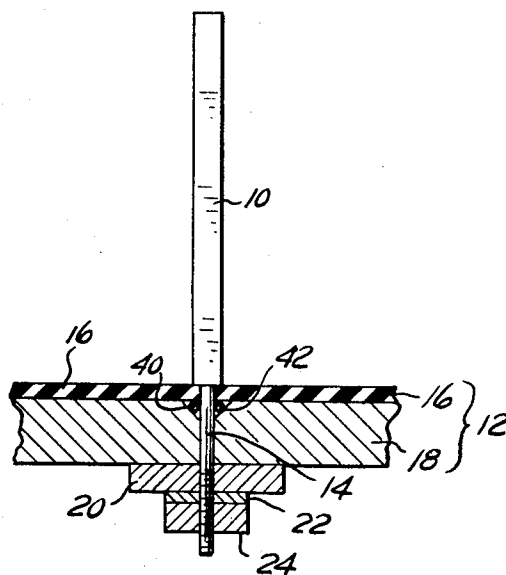


FIG. 1

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APPARATUS FOR SEALING AN ANODE CONNECTION AND METHOD THEREFOR

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4 Claims

ABSTRACT OF THE DISCLOSURE

In a diaphragm-type electrolytic cell for the production of chlorine and caustic alkali from alkali metal chloride solutions and having a resilient bottom sheeting covering the bottom, an improved seal for the purpose of keeping of corrosive electrolyte out of an anode connection is obtained by the use of an O-ring seal in combination with the resilient bottom sheeting.

BACKGROUND

(1) Field of the invention

This invention relates to electrolytic cells and particularly to electrolytic cells adapted for the production of chlorine and caustic, the cells being commonly known in the art as the diaphragm-type cell. A new method of keeping a corrosive electrolyte out of an anode connection is provided.

(2) Description of the prior art

In the typical electrolytic cell of the diaphragm type for use in the production of caustic and chlorine interposed between the corrosive electrolyte and the bus bar means and other components of the bottom of the cell is a layer of non-conductive non-corrosive material. Typically, as pointed out by James S. Sconce in the textbook, Chlorine, ACS Monograph No. 154, Reinhold Publishing Company, New York, N.Y. 1962, p. 94 et seq. which is incorporated herein by reference thereonto, the protective bottom layer has been a mastic, or polymeric material such as gum rubber sheeting. It is also known to use an O-ring seal made of polytetrafluoroethylene sold under trademarks such as Teflon and Kel-F in electrolytic cells for the purpose of keeping a corrosive electrolyte out of an anode connection, see U.S. Pat. 3,511,766. It is undesirable to have even a small amount of corrosive electrolyte leakage from a material balance standpoint, an electrical efficiency standpoint and/or gradual destruction of the equipment due to the corrosive attack.

Therefore, it is an object of this invention to provide an improved seal for keeping corrosive electrolyte out of an anode connection. This and other objects will become more apparent to those of skill in the art upon reading of the following specifications and study of the drawings attached hereto.

SUMMARY OF THE INVENTION

In accordance with this invention, there is provided a method for mounting an anode on the bottom of an electrolytic cell which comprises the steps of:

- (1) providing an opening in the bottom of an electrolytic cell having a chamfered upper portion adapted to receiving an O-ring,
- (2) seating an O-ring in said chamfered portion,
- (3) superimposing a sheet of resilient, corrosion resistant material having a perforation therein over said opening so that said perforation and said opening are in substantial axial alignment with each other,
- (4) mounting an anode over said opening by a fastening means which passes through said opening, and

- (5) securing said fastening means against the cell bottom thereby compressing both said resilient material and said O-ring;

5 said O-ring being more readily compressible than said resilient material.

DESCRIPTION OF THE DRAWING

FIG. 1 is a cutaway end view of a simple embodiment of the apparatus of this invention. FIG. 2 is a partial sectional view of an electrolytic cell employing the invention as illustrated in FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

15 In this invention as shown in FIG. 1 there is provided a cell bottom 12 comprised of a resilient, nonconductive, corrosion resisting material top layer 16 and a bottom layer (which for convenience will simply be referred to as metal bottom) 18 which each contain apertures in axial alignment with each other through which the anode stud 14 passes through the cell bottom 12 to and through the bus bar means 20 and an electrically conductive relationship is achieved by the use of a washer 22 and a nut 24 being placed on the stud 14 and drawn tight against bus bar means 20. The invention resides in the providing of the chamfer area 40 to the metal bottom 18 and inserting in the chamfered opening an O-ring 42 which is made of a more readily compressible material than the resilient corrosion resistant layer material 16. O-ring 42 is so recessed as to provide compression for the seal upon mating of the anode 10, etc.

The non-conductive corrosion resistant material utilized in the layer or liner 16 and in the O-ring 42 can be made of any well known materials of the prior art including but not limited to rubber, chlorinated plastics, polymers and copolymers of trifluorochloroethylene, tetrachloroethylene and tetrafluoroethylene sold under the trade names such as Teflon and Kel-F. In selecting the particular grade of material to be used in the liner 16 and O-ring 42 it is important to keep in mind that the O-ring 42 is more readily compressible than the liner 16 and, therefore, the O-ring 42 should have at least as much as and preferably slightly more, said 5 percent, compressibility than liner 16 when measured by the same test method.

FIG. 2 illustrates the placement of the anodes employing the method and apparatus of this invention within the conventional diaphragm electrolytic cell. It will be seen that the anode 10 is surrounded by the diaphragm cathode 26 which attaches to the cell or "can" wall 28, the cell being provided with a hydrogen gas outlet 30, weak cell liquor outlet 40, and chlorine outlet 32. A gasket 34 is provided between the bottom of the cell wall 28 and cell bottom 12 and the two are kept in connection by clip means 36. The cell is completed with the addition of the cover 38.

The materials and construction of the anode 10 and the stud 14 are matters of choice by the cell designer affecting only matters beyond the scope of this invention and, therefore, further elaboration is not needed on this detail, especially in view of Sconce, supra.

Means for applying a compression to the resilient non-conductive corrosion resistant material 16 and the O-ring 42 is illustrated in FIG. 1 by the use of a washer 22 and nut 24 on stud 14 although for the purpose of this invention any other acceptable means which provides an electrically conductive relationship between stud 14 and bus bar 20 can be used. Sufficient to say a beveled washer instead of the flat washer 22 may be employed or washer 22 may be omitted and a beveled nut 24 be employed in place of the flat nut 24 shown in FIG. 1.

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The invention is assembled by providing in the metal cell bottom 18 an opening or aperture of suitable diameter for the passing of anode stud 14, to the top side of metal bottom 18 a chamfer 40 is applied to the opening, the appropriate O-ring 42 is then inserted and the resilient corrosion resistant non-conductive lining material 16 with corresponding openings or apertures is placed over cell bottom 18 such that the openings are axially aligned. Thereafter anode stud 14 is inserted through the opening and the anode is secured by the fastening means against the cell bottom by compressing both the resilient material 16 and the O-ring 42.

It will be appreciated that many other modifications and ramifications will naturally suggest themselves to those skilled in the art based on this disclosure. These ramifications and modifications are intended to be comprehended as within the scope of this invention.

Having thus described the invention, what it is desired to claim and secure by Letters Patent is:

1. In a diaphragm-type electrolytic cell for the production of chlorine and caustic with alkali metal chloride solutions the improvement comprising:

a compressible O-ring inserted into a chamfered area of an anode receiving aperture of a cell bottom and in contact with a resilient non-conductive corrosion resistant bottom material having perforations therein which are axially aligned with the anode receiving aperture of the cell bottom, said O-ring being more readily compressible than said resilient material and both being compressed when the anode for the cell is installed.

2. The electrolytic cell of claim 1 wherein said O-ring is made of a material which is not subject to corrosive attack by chlorine.

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3. The cell according to claim 2 wherein said O-ring is made of polytetrafluoroethylene.

4. A method for mounting an anode on the bottom of an electrolytic cell which comprises the steps of:

- (1) providing an opening in the bottom of an electrolytic cell having a chamfered upper portion adapted to receiving an O-ring,
- (2) seating an O-ring in said chamfered portion,
- (3) superimposing a sheet of resilient, corrosion resistant material having a perforation therein over said opening so that said perforation and said opening are in substantial axial alignment with each other,
- (4) mounting an anode over said opening by fastening means which passes through said opening, and
- (5) securing said fastening means against the cell bottom thereby compressing both said resilient material and said O-ring;

said O-ring being more readily compressible than said resilient material.

References Cited

UNITED STATES PATENTS

3,591,483	7/1971	Lofffield et al.	204—266
3,429,799	2/1969	McWhorter	204—279
2,905,614	9/1959	Porrata et al.	204—286
3,511,766	5/1970	Kisner et al.	204—279
3,455,810	7/1969	Holm	204—286

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