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ELECTROLYTIC CELL CONTAINER

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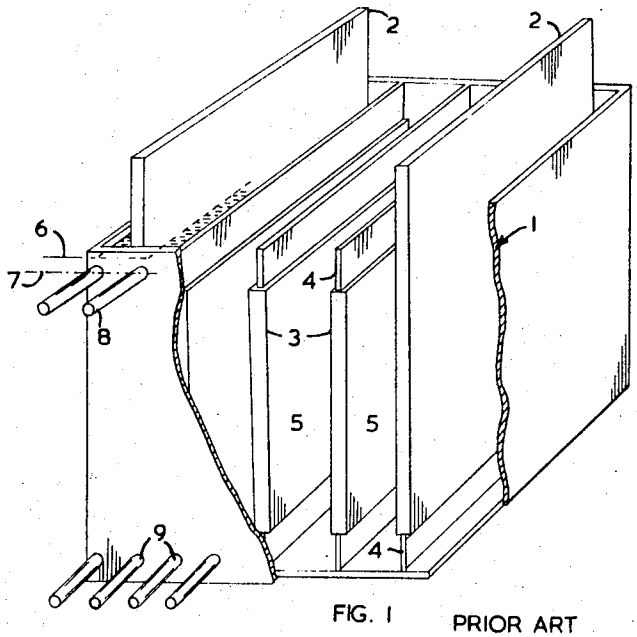


FIG. 1 PRIOR ART

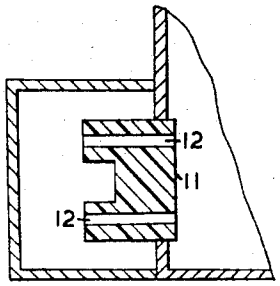


FIG. 3

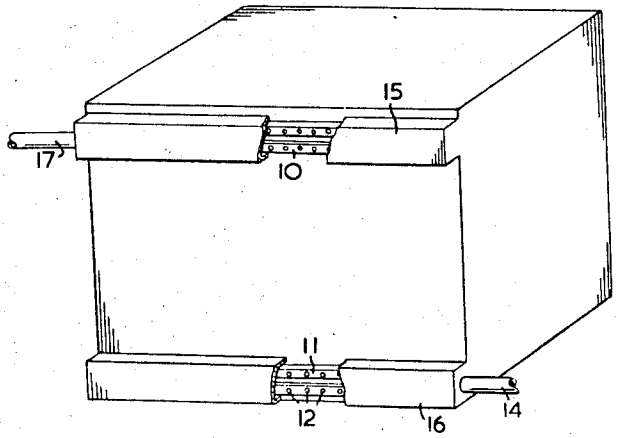


FIG. 2

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ELECROLYTIC CELL CONTAINER

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6 Claims. (Cl. 204—269)

ABSTRACT OF THE DISCLOSURE

The provision in an electrolytic cell tank of an electrolytic cell used in the electrolytic refining of corrosive liquids, of the inlets and outlets respectively at the base and top of the cell tank in the form of spaced holes in a block of material resistant to corrosion located on the side of the tank, the holes communicating with the interior of the cell tank.

This invention relates to a new and improved apparatus for electrolytic refining and more particularly for the electrolytic refining of corrosive liquids.

Commercial electrolytic processes may be carried out in large vats with fresh feed supplied through a series of tubes to the bottom portion of the electrolysing chambers. Electrolysed liquor will rise to the surface of the solution and is removed from the vat through a similar series of tubes. The installation of these tubes is expensive because they must be welded or soldered into place individually. Special care must also be taken to avoid an imperfect joint because the corrosive feed and electrolysed liquor will react with the joint at such imperfection and rapidly corrode the vat material. In addition, the perforation of a large tank with a series of holes tends to structurally weaken the tank and this will be aggravated by the combination of liquid pressure and corrosion effects. Also the cross sectional area available for flow of liquor feed in, and electrolysed liquor out per square foot of side or bottom of the vat is limited because welding space is required between the tubes and wall space must also be left to give the bottom or sides some strength. The diameter and length of tubes is carefully calculated to give best flow rate with least leakage current through the tubes. With tubes which break or flake off at the ends due to corrosion of their relatively thin walls, the accuracy of design is lost and the cell becomes inefficient. Finally the tubes tend to become abused during use and this causes bending and eventual fracturing at the joint.

It is an object of this invention to provide an electrolysis cell tank having no external tubes and reinforced at the upper and lower areas.

Further objects of this invention will become apparent from the description to follow:

The objects of this invention are attained in an electrolysis cell tank bearing dimensionally stable, inert blocks positioned in the upper and lower areas of the tank, the said blocks being adapted to convey liquids to and remove liquids from the said tank. Many plastics, slate, ceramics, glass, rubbers, etc. are of course available for the required purposes. It has been found that polyvinyl chloride is quite satisfactory since it provides a combination of dimensional stability, inertness to chemicals and rigidity while being relatively inexpensive. Polymers which contain plasticizers as extrusion aids should not be employed since leaching out of the plasticizer by the electrolyte yields a porous structure that is rendered less resistant to chemical attack.

In the diagrams:

FIG. 1 illustrates a perspective view of an electrolysis tank of a typical cell of the prior art.

FIG. 2 represents a perspective view of an electrolysis tank according to the present invention; and

FIG. 3 illustrates a sectional view of a perforated polymeric block.

In the drawings a typical prior art cell is shown in FIG. 1 having an outer wall **1**, monopolar electrodes **2**, and multipolar intermediate electrodes **3**. The multipolar electrodes are sealed into grooves in the side wall to form individual and separate compartments **5**. Adjacent cell compartments are separated from each other by insulating elements **4**. The cell block is placed in a large tank (not shown) so that the level of liquor in the tank is as shown at **7**. In normal operating conditions the inside level will be as shown at **6** and the difference in hydrostatic levels between **6** and **7** will produce the outflow of liquor from the cell box. This outflow is through pipes **8**, the raw or dilute electrolyte having been taken in at the bottom of the tank through pipes **9** as mentioned. If desired, the lower pipes may be provided with manifolds **15**, **16** (FIG. 2) each manifold having a lead **14**. The provision of holes for pipes **8**, **9** weakens the tank structure and since the pipes themselves may be broken off or weakened, the surface exposed as a consequence provides sites for corrosion. Furthermore, the pipes are expensive to install.

The present invention is illustrated in FIG. 2 and it will be of course observed that the intake and outlet pipes have been replaced by polymeric block elements **10**, **11** positioned at the top and bottom respectively of the cell tank and bearing perforations **12**. If a positive recirculation is desired, a manifold **16** with intake lead **14** may be provided for the lower set of perforations with a pump forcing liquid through the leads. The liquid may be drained off from the upper perforations by means of a second manifold **15** surrounding these perforations which is emptied by outlet pipe **17**.

The bottom and top blocks may be bolted, welded or clamped to the tank and positioned in tank wall opening **18** through which they extend. Since the weight of the tank is brought to bear on the bottom block **11** there is less chance for a structural defect such as buckling to occur in the cell tank wall, because of the stiffening effect of the blocks, than in the prior art type. Different diameter holes to give most economic operation can easily be drilled in the block, whereas it is not practical to install long, thin tubes or pipes because of breakage and difficulty in welding small pipes. It is evident that there would be more current leakage close to the monopolar electrodes of a multipolar cell to the mass of electrolyte surrounding the electrolyzing chambers.

A typical block is shown in FIG. 3. Made of polyvinyl chloride, it is provided with a series of indentations (not shown) for fitting over the monopolar and multipolar electrodes. The block may also be moulded for fitting inside the tank to give it rigidity.

I claim:

1. In a multipolar electrolytic cell comprising a cell box having a plurality of monopolar electrodes and a plurality of multipolar electrodes therein, said electrodes dividing the interior of said cell box into a plurality of separate cell units, said cell box having a plurality of horizontally spaced inlets adjacent the base thereof and a plurality of horizontally spaced outlets adjacent the top thereof whereby electrolyte may be recirculated from a reservoir tank upwardly and in parallel flow through said cell unit via said inlets and outlets the improvement in which said inlets and outlets are each in the form of spaced holes in a block of material resistant to corrosion, each block being located on a side of the cell box, and the holes in each box communicating directly from the interior of the cell box to the reservoir tank.

2. A cell as claimed in claim **1** in which each block is formed from a synthetic resinous material.

3. A cell as claimed in claim 1 in which each block is formed from an unplasticized synthetic resinous material.

4. A cell as claimed in claim 1 in which each block is formed of unplasticized polyvinyl chloride.

5. A cell as claimed in claim 1 in which the holes forming the inlets or the holes forming the outlets or both of said set of holes are of different diameters.

6. A cell as claimed in claim 1 in which each block extends through the wall of the tank and is adapted on its inner surface to accommodate the electrodes in the tank.

References Cited

UNITED STATES PATENTS

1,575,627	3/1926	Heinze	204—278
2,515,614	7/1950	Schumacher	204—274
2,943,989	7/1960	Kollsman.	
3,014,855	12/1961	Kressman.	
3,025,227	3/1962	Kollsman	204—180
3,091,583	5/1963	Schufle	204—301
3,150,069	9/1964	Nellen	204—301
2,350,669	6/1944	Boller	204—237
3,324,023	6/1967	Kircher	204—256

FOREIGN PATENTS

585,596	10/1933	Germany.

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