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Huens et al.

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(54) **APPARATUS FOR CONTROLLING FLOW IN AN ELECTRODEPOSITION PROCESS**

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(\* ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 8 days.

4,285,794 A	8/1981	Bellows et al. ....	204/260
4,330,386 A	5/1982	Korinek et al. ....	204/223
4,435,258 A	3/1984	Melka, Jr. et al. ....	204/109
4,608,136 A	8/1986	Vaughan et al. ....	204/106
4,636,274 A	1/1987	Gruver et al. ....	156/279
4,789,439 A	12/1988	Bunk et al. ....	204/28
5,082,538 A	1/1992	DeRespiris et al. ....	205/140
5,183,544 A	2/1993	Weber et al. ....	204/252
5,248,398 A	9/1993	Cordani ....	204/106
5,470,445 A	11/1995	Murray et al. ....	204/105 R
5,855,749 A	1/1999	Kohut et al. ....	204/470

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(52) **U.S. Cl.** ..... **204/269; 204/237; 204/273; 204/278.5**

(58) **Field of Search** ..... **204/269, 273, 204/237, 278.5**

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

4,279,732 A 7/1981 Bellows et al. .... 204/269

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(57) **ABSTRACT**

An electrowinning cell, having a tank with an opened upper end defined by a tank edge, electrolyte within the tank and a plurality of flat, metallic electrode plates disposed within the tank in side-by-side, spaced-apart, parallel relationship. Adjacent electrode plates define an electrode gap therebetween. An injector manifold is disposed at the bottom of the tank for feeding electrolyte into the tank at locations below the electrode plates. A collector grid, comprised of a plurality of collectors having ports, define an upper level of electrolyte by collecting the electrolyte from the tank. The ports are disposed in spaced-apart relationship within the open upper end defined by the tank edge. The collector grid and the injector creating a flow of electrolyte upward between the plates as the electrolyte flows from the manifold locations below the plates to the ports.

**2 Claims, 11 Drawing Sheets**

