US008308920B2

(12) **United States Patent**
Ashford et al.

(10) **Patent No.: US 8,308,920 B2**
(45) **Date of Patent: *Nov. 13, 2012**

(54) **DOUBLE CONTACT BAR INSULATOR ASSEMBLY FOR ELECTROWINNING OF A METAL**

(75) Inventors: **Bret Ashford**, Silver City, NM (US); **William A Ebert**, Tucson, AZ (US); **Fernando D Mollo Vega**, Iquique (CL); **Samuel Rasmussen**, Sheridan, WY (US); **Timothy G Robinson**, Scottsdale, AZ (US); **Scot P Sandoval**, Morenci, AZ (US)

(73) Assignee: **Freeport-McMoran Corporation**, Phoenix, AZ (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **13/170,677**

(22) Filed: **Jun. 28, 2011**

(65) **Prior Publication Data**

US 2011/0284369 A1 Nov. 24, 2011

Related U.S. Application Data

(63) Continuation of application No. 12/265,992, filed on Nov. 6, 2008, now Pat. No. 7,993,501.

(60) Provisional application No. 60/986,211, filed on Nov. 7, 2007.

(51) **Int. Cl.**
C25B 9/04 (2006.01)
C25B 9/02 (2006.01)

(52) **U.S. Cl.** **204/279**; 204/228.1; 204/230.2; 204/232; 204/242; 204/267; 204/278.5; 204/286.1; 204/297.01

(58) **Field of Classification Search** 204/267, 204/278.5, 286.1, 297.01, 228.1, 230.2, 279, 204/232, 242; 205/574, 602
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

315,265	A		4/1885	Farmer
789,353	A		8/1905	Betts
1,095,748	A		5/1914	Thum
1,501,692	A		7/1924	Ward
3,579,431	A		5/1971	Jasberg
3,697,404	A	*	10/1972	Paige 204/267
3,929,614	A		12/1975	Hidohira
4,035,280	A		7/1977	Deane et al.
4,213,842	A		7/1980	Dufresne

(Continued)

FOREIGN PATENT DOCUMENTS

DE 19940698 3/2001

OTHER PUBLICATIONS

ISR and Written Opinion from corresponding International App. No. PCT/US2008/082754 dated Feb. 27, 2009.

(Continued)

Primary Examiner — Bruce Bell
(74) *Attorney, Agent, or Firm* — Snell & Wilmer L.L.P.

(57) **ABSTRACT**

In various embodiments, the present invention provides an electrolytic cell contact bar having a first pole and a pair of second poles. The second poles are opposite in charge to the first pole and each of the pair of second poles are adjacent to and parallel to the first pole. In various embodiments, the contact bar may include an electrode holder capable of holding at least one electrode.

20 Claims, 11 Drawing Sheets