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(54) **METHOD FOR RECOVERING METAL VALUES FROM METAL-CONTAINING MATERIALS USING HIGH TEMPERATURE PRESSURE LEACHING**

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(56) **References Cited**

U.S. PATENT DOCUMENTS

3,260,593 A	7/1966	Zimmerley et al.
3,528,784 A	9/1970	Green
3,637,371 A	1/1972	Mackiw et al.
3,656,888 A	4/1972	Barry et al.
3,669,651 A	6/1972	Spedden et al.
3,868,440 A	2/1975	Lindblad et al.
3,896,208 A	7/1975	Dubeck et al.
3,949,051 A	4/1976	Pawlek et al.
3,958,985 A	5/1976	Anderson
3,961,028 A	6/1976	Parker et al.
3,962,402 A	6/1976	Touro
3,985,553 A	10/1976	Kunda et al.
3,991,159 A	11/1976	Queneau et al.
4,017,309 A	4/1977	Johnson
4,020,106 A	4/1977	Ackerley et al.
4,028,462 A	6/1977	Domic et al.
4,029,733 A	6/1977	Faugeras
4,039,405 A	8/1977	Wong
4,039,406 A	8/1977	Stanley et al.
4,046,851 A	9/1977	Subramanian et al.
4,069,119 A	1/1978	Wong
4,091,070 A	5/1978	Riggs et al.
4,120,935 A	10/1978	Fountain et al.
4,150,976 A	4/1979	Dain
4,157,912 A	6/1979	Weir et al.
4,165,362 A	8/1979	Reynolds
4,256,553 A	3/1981	Baczek et al.

4,266,972 A	5/1981	Redondo-Abad et al.
4,272,341 A	6/1981	Lamb
4,338,168 A	7/1982	Stanley et al.
4,405,569 A	9/1983	Dienstbach
4,415,540 A	11/1983	Wilkomirsky et al.
4,442,072 A	4/1984	Baglin et al.
4,507,268 A	3/1985	Kordosky et al.
4,571,264 A	2/1986	Weir et al.
4,619,814 A	10/1986	Salter et al.
4,775,413 A	10/1988	Horton et al.
4,814,007 A	3/1989	Lin et al.
4,875,935 A	10/1989	Gross et al.
4,880,607 A	11/1989	Horton et al.
4,892,715 A	1/1990	Horton
4,895,597 A	1/1990	Lin et al.
4,971,662 A	11/1990	Sawyer et al.
4,992,200 A	2/1991	Lin et al.
5,028,259 A	7/1991	Lin et al.
5,059,403 A	10/1991	Chen
5,073,354 A	12/1991	Fuller et al.
5,176,802 A	1/1993	Duyvesteyn et al.
5,223,024 A	6/1993	Jones
5,316,567 A	5/1994	Jones
5,356,457 A	10/1994	Alvarez et al.
5,670,035 A	9/1997	Virnig et al.
5,698,170 A	12/1997	King
5,730,776 A	3/1998	Collins et al.
5,770,170 A	6/1998	Collins et al.
5,849,172 A	12/1998	Allen et al.
5,869,012 A	2/1999	Jones
5,895,633 A	4/1999	King
5,902,474 A	5/1999	Jones
5,917,116 A	6/1999	Johnson et al.
5,989,311 A	11/1999	Han et al.
5,993,635 A	11/1999	Hourn et al.

FOREIGN PATENT DOCUMENTS

AU	0219785	12/1958
AU	219785	12/1958
WO	01/00889 A1	1/2001

OTHER PUBLICATIONS

G. M. Ritcey, et al., "Solvent Extraction, Principles and Applications to Process Metallurgy," Part II, 1979, pp. 218-221, no month.

Jan Szymanowski, Ph. D., "Hydroxyoximes and Copper Hydrometallurgy," CRC Press, 6 pages, no date.

Dalton, et al., "The CUPREX Process—a new chloride-based hydrometallurgical process for the recovery of copper from sulphidic ores," 11 pages, 1987, no month.

(List continued on next page.)

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(57) **ABSTRACT**

The present invention relates generally to a process for recovering copper and other metal values from metal-containing materials through pressure leaching operations. In accordance with the various aspects of the present invention, metal-containing pregnant leach solutions from pressure leaching operations need not be significantly diluted to facilitate effective metal recovery using solvent extraction and electrowinning.