

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
28 December 2006 (28.12.2006)

PCT

(10) International Publication Number
WO 2006/138033 A3

- (51) **International Patent Classification:**
C25D 5/10 (2006.01) C25D 5/50 (2006.01)
C25D 5/12 (2006.01)
- (21) **International Application Number:**
PCT/US2006/020205
- (22) **International Filing Date:** 24 May 2006 (24.05.2006)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
11/155,426 17 June 2005 (17.06.2005) US
- (71) **Applicant (for all designated States except US):** JARDEN ZINC PRODUCTS, INC [US/US]; 2500 Old Stage Road, Greenville, TN 37745 (US).
- (72) **Inventors:** McDANIEL, Paul; 1235 Old Boones Creek Road, Jonesborough, TN 37659 (US). SMELCER, Johnny; 11360 Warrensburg Road, Midway, TN 37809 (US). BEETS, Randy; 355 Porter Kite Road, Bulls Gap, TN 37711 (US). GILES, Albert; 220 Hollow Tree Court, Greeneville, TN 37745 (US).
- (74) **Agent:** ST. AMOUR, Brion, G.; Bose McKinney & Evans LLP., 135 North Pennsylvania Street, Suite 2700, Indianapolis, IN 46204 (US).

- (81) **Designated States (unless otherwise indicated, for every kind of national protection available):** AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) **Designated States (unless otherwise indicated, for every kind of regional protection available):** ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

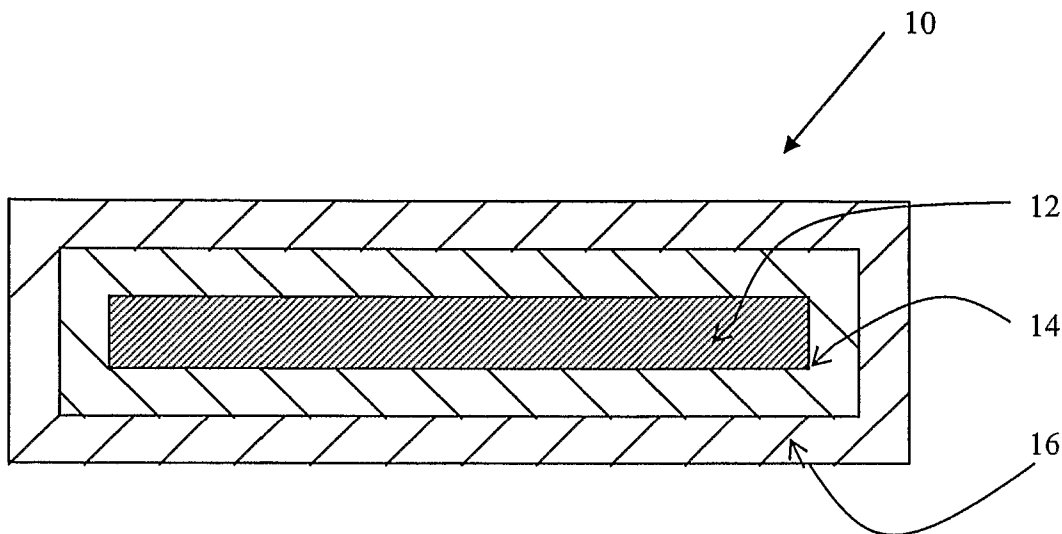
Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

(88) **Date of publication of the international search report:**
7 June 2007

[Continued on next page]

(54) **Title:** SUBSTRATE WITH ALLOY FINISH AND METHOD OF MAKING



(57) **Abstract:** Substrates having an alloy finish and methods of producing the same. The finished product according to one embodiment of the present invention is a substrate having an alloy finish comprising two or more metals, and is made by the method of the present invention. Generally, the method of the present invention comprises provision of a substrate, electroplating two or more metals onto the substrate, and then baking the plated substrate to result an alloy of the plated metals through diffusion. Substrates made according to the present invention can be covered with a variety of types of alloy finishes, and a variety of characteristics of such finishes can be achieved. The method of the present invention uses steps of electroplating and heating that are well-known in the art, and does not require the use of toxic, cyanide-based plating baths.

WO 2006/138033 A3



For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2006/020205

A. CLASSIFICATION OF SUBJECT MATTER
 INV. C25D5/10 C25D5/12 C25D5/50

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
 C25D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
 EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2 392 456 A (BROWN HENRY ET AL) 8 January 1946 (1946-01-08)	6, 23
Y	page 2, left-hand column, line 64 - right-hand column, line 15 claims 1-3	2-5
X	US 4 432 839 A (KLINE ET AL) 21 February 1984 (1984-02-21)	6, 23
Y	examples 3-5 claims 1-3	2-5
X	EP 0 179 517 A (N.V. BEKAERT S.A) 30 April 1986 (1986-04-30)	6, 23
Y	page 13 claims 10,11	2-5
	----- -/--	

Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents :

<p>*A* document defining the general state of the art which is not considered to be of particular relevance</p> <p>*E* earlier document but published on or after the international filing date</p> <p>*L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>*O* document referring to an oral disclosure, use, exhibition or other means</p> <p>*P* document published prior to the international filing date but later than the priority date claimed</p>	<p>*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>*Z* document member of the same patent family</p>
--	--

Date of the actual completion of the international search 12 September 2006	Date of mailing of the international search report 16/04/2007
---	---

Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer Haering, Christian
---	---

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2006/020205

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 475 640 B1 (DOUJAK SIEGFRIED ET AL) 5 November 2002 (2002-11-05)	6,23
Y	claims 1-6 column 5, lines 43-46	2-5
X	WO 03/012174 A (PIRELLI PNEUMATICI S.P.A; PAVAN, FEDERICO) 13 February 2003 (2003-02-13) claims 1,10	6,23
X	KOSTISHYN V G ET AL: "INFLUENCE OF CORONA DISCHARGE ON THE HYSTERESIS LOOP OF MAGNETIC GARNET FILMS" JOURNAL OF MAGNETISM AND MAGNETIC MATERIALS, ELSEVIER SCIENCE PUBLISHERS, AMSTERDAM, NL, vol. 160, 1 July 1996 (1996-07-01), pages 363-364, XP000625292 ISSN: 0304-8853 abstract	6,23
X	STARINSHAK T W ET AL: "ENGINEERING BRASS COATINGS BY SEQUENTIAL PLATING" CHEMICAL ABSTRACTS + INDEXES, AMERICAN CHEMICAL SOCIETY. COLUMBUS, US, vol. 109, no. 12, 1 September 1988 (1988-09-01), page 515, XP000018644 ISSN: 0009-2258 abstract	6,23
X	EP 0 525 956 A (GOULD INC) 3 February 1993 (1993-02-03) abstract	7,24
Y	claims 1-7,16	2-5
X	US 3 869 261 A (KATSUMA ET AL) 4 March 1975 (1975-03-04) abstract	7,24
Y	claims 1-3	2-5
X	US 2 304 709 A (RUBIN MICHAEL M) 8 December 1942 (1942-12-08) claim 1	7,24
Y	page 1, left-hand column, line 54 - right-hand column, line 24	2-5
X	GB 1 465 169 A (USUI KOKUSAI SANGYO KK) 23 February 1977 (1977-02-23) page 1, lines 28-35 page 1, line 79 - page 2, line 4 claims 1-13	7,24
	-/--	

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2006/020205

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 457 780 A (RICHARD THOMAS & CO., LIMITED; ALBERT WILLIAM KIEFT; ERNST MEHL; OTTOK) 4 December 1936 (1936-12-04)	7,24
Y	the whole document examples 1-3 claims 1-8	2-5
A	----- GB 2 086 426 A (FURUKAWA CIRCUIT FOIL CO LTD) 12 May 1982 (1982-05-12) abstract; example 1 -----	8

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2006/020205

Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.: 1, 12, 22
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
see FURTHER INFORMATION sheet PCT/ISA/210

3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

see annex

Remark on Protest

- The additional search fees were accompanied by the applicant's protest.
- No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.2

Claims Nos.: 1,12,22

1. The present claims 1, 12, 22 relates to an extremely large number of possible methods or articles produced with said methods. Support and disclosure in the sense of Article 6 and 5 PCT is to be found however for only a very small proportion of the methods claimed, see p.5, 1.11 - p.6, 1.19. The non-compliance with the substantive provisions is to such an extent, that the search was performed taking into consideration the non-compliance in determining the extent of the search of claims 1, 12, 22 (PCT Guidelines 9.19 and 9.23).

There is indeed no support for a method as claimed in claim 1 wherein the first layer can be tin or zinc, neither there is support for a method wherein the second layer is nickel.

2. Further, the initial phase of the search revealed a very large number of documents relevant to the issue of novelty of claims 1, 12 to 22.

2.1. So many documents were retrieved that it is impossible to determine which parts of claim 1 may be said to define subject-matter for which protection might legitimately be sought (Article 6 PCT). For these reasons, the search was performed taking into consideration the non-compliance in determining the extent of the search of claims 1 and 12 to 22. Indeed, there are 12 different alloy finishes possible to be produced regarding said claim, and the substrate itself being only defined in that it comprises another metal than the ones comprised in the electroplated layers, thus said substrate comprising many possibilities (though only few were supported by the description).

2.2. Further, the different articles claimed under 12 to 22, characterised by the production method of claim 1 thus are also considered as too broad in scope. Moreover those claimed product-by-process are considered as lacking novelty over the prior art, since similar articles produced by another process than the one claimed are not different to said products or articles.

3. Consequently, claims 1 and 12 to 22 were not searched. The search was restricted to the method claims 6 to 8 in a first step (see lack of unity), 9 in a second one (if fees are paid for), though not being supported by the description, 10 and 11 in a third one (if fees are paid for), and the corresponding articles 23-25, 26 and 27, 28, which appear to be more or less supported, as follows:

- a. first plated layer being copper, second layer being tin or zinc. The eventual third layer for producing a Cu-Sn-Zn layer system is also acknowledged;
- b. first plated layer being tin, second layer being zinc;
- c. first plated layer being nickel, second layer being tin or zinc.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.5), should the problems which led to the Article 17(2) declaration be overcome.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 6-8,23-25

Method (and article formed therewith) for producing a finish on a substrate comprising:

- electroplating copper, then
- electroplating zinc or tin, then
- heat treating.

(IPC classes: C25D5/10 + C25D5/50)

1.1. claims: 6,23

Method (and article formed therewith) for producing a brass finish on a substrate comprising:

- electroplating copper, then
- electroplating zinc, then
- heat treating.

1.2. claims: 7,8,24,25

Method (and article formed therewith) for producing a bronze finish on a substrate comprising:

- electroplating copper, then
- electroplating tin, then
- heat treating.

A third layer of zinc can be additionally electroplated on the second layer of tin, before the heat treatment.

2. claims: 9,26

Method (and article formed therewith) for producing a silvery or white appearance on a substrate comprising:

- electroplating tin, then
- electroplating zinc, then
- heat treating.

(IPC classes: C25D5/10 + C25D5/50)

3. claims: 10,11,27,28

Method (and article formed therewith) for producing a silvery or white appearance on a substrate comprising:

- electroplating nickel, then
- electroplating zinc or tin, then
- heat treating.

(IPC classes: C25D5/12 + C25D5/50)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2006/020205

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 2392456	A	08-01-1946	NONE	
US 4432839	A	21-02-1984	NONE	
EP 0179517	A	30-04-1986	AU 580100 B2	22-12-1988
			AU 4885585 A	01-05-1986
			BR 8505270 A	29-07-1986
			CA 1250198 A1	21-02-1989
			DE 3566684 D1	12-01-1989
			JP 2620220 B2	11-06-1997
			JP 61117287 A	04-06-1986
			US 4645718 A	24-02-1987
US 6475640	B1	05-11-2002	BR 9904763 A	15-08-2000
			JP 2000154485 A	06-06-2000
WO 03012174	A	13-02-2003	NONE	
EP 0525956	A	03-02-1993	CA 2070046 A1	29-12-1992
			CN 1068155 A	20-01-1993
			JP 6184784 A	05-07-1994
US 3869261	A	04-03-1975	NONE	
US 2304709	A	08-12-1942	NONE	
GB 1465169	A	23-02-1977	NONE	
GB 457780	A	04-12-1936	FR 807170 A	06-01-1937
GB 2086426	A	12-05-1982	NONE	