



(51) International Patent Classification:

B65G 49/04 (2006.01) *B05C 3/09* (2006.01)
B05D 1/00 (2006.01) *B05C 11/08* (2006.01)
B05D 1/18 (2006.01) *B05C 13/02* (2006.01)
B05C 3/05 (2006.01)

(21) International Application Number:

PCT/US2012/039652

(22) International Filing Date:

25 May 2012 (25.05.2012)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

61/490,434 26 May 2011 (26.05.2011) US

(71) Applicant (for all designated States except US): **AD-
VENIRA ENTERPRISES, INC.** [US/US]; 788 Palomar
Ave., Sunnyvale, CA 94085 (US).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **RYABOVA, Elmira**
[US/US]; 788 Palomar Ave., Sunnyvale, CA 94085 (US).

(74) Agents: **GUSEV, Vladimir, Y.** et al.; Kwan & Olynick
LLP, 2000 Hearst Street Ste.305, Berkeley, CA 94709
(US).

(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ,
CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO,
DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN,
HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR,
KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME,
MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ,
OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD,
SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR,
TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ,
UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ,
TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK,
EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV,
MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM,
TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: SYSTEM AND PROCESS FOR COATING AN OBJECT

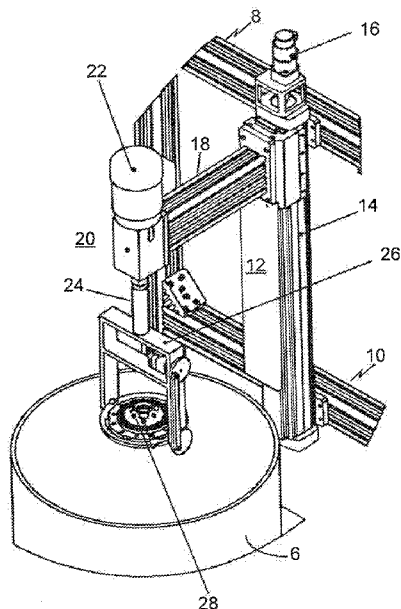


Fig. 13

(57) Abstract: Coating systems (1700, 1800, 1900) and processes are disclosed for uniformly coating objects (28, 802, 926, 1026, 1126). The system (1700, 1800, 1900) comprises a pre-treatment unit (1704, 1804, 1904), a first processing unit (1706, 1806, 1906), a first post-treatment unit (1708, 1808, 1908) and one or more coating apparatus (800, 900, 1000, 1100) each configured to engage an object (28, 802, 926, 1026, 1126) and rotate the object around or about two or more axes. The coating apparatus (800, 900, 1000, 1100) used in the system can comprise a first gimbal (26, 808, 902, 1002, 1102) connected to a first rotational mechanism (24, 810, 904, 1004, 1104) to allow rotation of the first gimbal (26, 808, 902, 1002, 1102) around or about a first axis, a second gimbal (812, 906, 1006, 1106) connected to the first gimbal (26, 808, 902, 1002, 1102) to allow rotation around or about a second axis and optionally a third gimbal (916) connected to the second gimbal to allow rotation around or about a third axis. An object holder (46, 48, 822, 924, 1024, 1124) is connected to the second/third gimbal. When an object is present in the object holder (46, 48, 822, 924, 1024, 1124), it can be immersed in a coating solution to form a coated object. The coated object is then rotated around or about two or three axes which produces a multi-directional centrifugal force together with the force of gravity creates a three dimensional tensor force which causes the coating solution to spread evenly over all or part of the object or a complex surface of the object to produce a uniform thin film. Composites comprising the object with a uniform thin film coating covalently attached to at least all or part of the object or a complex surface of the object are also disclosed.

WO 2012/162642 A3



Published:

(88) Date of publication of the international search report:

27 March 2014

- *with international search report (Art. 21(3))*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2012/039652

A. CLASSIFICATION OF SUBJECT MATTER
 INV. B65G49/04 B05D1/00 B05D1/18 B05C3/05 B05C3/09
 B05C11/08 B05C13/02
 ADD.
 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)
 B05C B05D B65G B05B C08G C09D B29C

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 practicable, search terms used)
 EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2001/019004 A1 (SAGANE CHITOSHI [JP] ET AL) 6 September 2001 (2001-09-06) paragraphs [0077] - [0088]; figures -----	1-6,11,12,15,18
X	WO 2008/025498 A1 (HOLDER RAINER [DE]; HOLDER JOCHEN [DE]) 6 March 2008 (2008-03-06) page 10 - page 12; claims; figures -----	19-26
X	JP 2004 071186 A (MATSUSHITA ELECTRIC IND CO LTD) 4 March 2004 (2004-03-04) the whole document -----	19-29
X	US 2010/178414 A1 (JUDGE FEARGAL D [IE] ET AL) 15 July 2010 (2010-07-15) paragraphs [0031] - [0051]; figures ----- -/--	19-26

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

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance	"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
"E" earlier application or patent but published on or after the international filing date	"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
"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)	"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
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search 28 January 2014	Date of mailing of the international search report 10/02/2014
--	--

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

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2012/039652

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 5 136 682 A (MOYER WENDELL W [US] ET AL) 4 August 1992 (1992-08-04) column 15, line 27 - column 20, line 40; figures	27-40
X	----- US 2010/129646 A1 (FISK THOMAS E [US] ET AL) 27 May 2010 (2010-05-27) paragraphs [0001], [0038] - [0072] -----	27-40

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2012/039652

Box No. 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.:
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:

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 No. 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 fees, this Authority did not invite payment of additional fees.

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.:

Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-18

claims 1-18 are directed to a coating system comprising a coating apparatus configured to be transported between the pre-treatment, the first processing and the post-treatment units. It is considered that the coating system having a coating apparatus configured to be transported between the different units of the system comprises a "first special technical feature".

2. claims: 19-26

claims 19-26 are directed to a coating process comprising the steps of: pre-treating, immersing, withdrawing, post-treating an object and further rotating said object around a first and second axis after said withdrawing. It is considered that the coating process having the step of rotating said object around a first and second axis after said withdrawing comprises a "second special technical feature".

3. claims: 27-40

claims 27-40 are directed to a composite comprising an object and a thin layer covalently bonded thereto with adhesion value greater than 3B. It is considered that the composite having an object and a thin layer covalently bonded thereto with adhesion value greater than 3B comprises a "third special technical feature".

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2012/039652

Patent document cited in search report	Publication date	Patent family member(s)	Publication date	
US 2001019004	A1	06-09-2001	CN 1305937 A	01-08-2001
			CN 1616328 A	18-05-2005
			ES 2219117 A1	16-11-2004
			IT RM20010010 A1	12-07-2002
			US 2001019004 A1	06-09-2001
			US 2003201148 A1	30-10-2003

WO 2008025498	A1	06-03-2008	DE 102006042632 A1	20-03-2008
			EP 2056972 A1	13-05-2009
			WO 2008025498 A1	06-03-2008

JP 2004071186	A	04-03-2004	NONE	

US 2010178414	A1	15-07-2010	AR 075357 A1	30-03-2011
			AU 2009316547 A1	27-05-2010
			CA 2744062 A1	27-05-2010
			CN 102256762 A	23-11-2011
			EP 2379298 A2	26-10-2011
			EP 2511062 A1	17-10-2012
			ES 2397688 T3	08-03-2013
			KR 20110103964 A	21-09-2011
			RU 2011124178 A	27-12-2012
			US 2010178414 A1	15-07-2010
			US 2013234365 A1	12-09-2013
			WO 2010059834 A2	27-05-2010

US 5136682	A	04-08-1992	US 5136682 A	04-08-1992
			WO 9218885 A1	29-10-1992

US 2010129646	A1	27-05-2010	AT 481437 T	15-10-2010
			AT 533810 T	15-12-2011
			CN 101679597 A	24-03-2010
			CN 101679655 A	24-03-2010
			EP 2150567 A1	10-02-2010
			EP 2152787 A1	17-02-2010
			ES 2349665 T3	10-01-2011
			ES 2375508 T3	01-03-2012
			JP 2010527817 A	19-08-2010
			JP 2010528158 A	19-08-2010
			JP 2013213222 A	17-10-2013
			KR 20100038305 A	14-04-2010
			US 2010129646 A1	27-05-2010
			US 2010184938 A1	22-07-2010
			WO 2008144614 A1	27-11-2008
WO 2008144615 A1	27-11-2008			
