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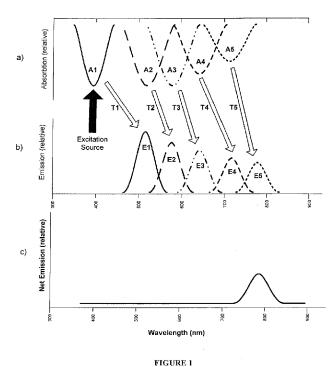
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Declarations under Rule 4.17:

[Continued on next page]

(54) Title: PHOTOLUMINESCENT MARKINGS WITH FUNCTIONAL OVERLAYERS



(57) Abstract: Provided are photoluminescent markings that contain a photoluminescent layer (12) and one or more functional overlayers (14) (18) (22) wherein the photoluminescent marking has an emission signature that lies partly or fully in the infrared region of the electromagnetic spectrum. One functional overlayer conceals the photoluminescent layer and blends into the background or blends with marks that are normally present, without significantly reducing the luminescent intensity of the photoluminescent layer. Another functional overlayer provides photolytic stability to the underlying photoluminescent layer. The invention also includes functional overlayers that enhance the daytime observability of the infrared emissions. A further functional overlayer prevents the observability of a printed message with the naked eye. A combination of functional overlayers each providing a different function is also included. As well, the present invention includes a multifunctional overlayer. The present invention also relates to methods of creating and using the inventive photoluminescent markings as well as objects containing the inventive photoluminescent markings.



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A. CLASSIFICATION OF SUBJECT MATTER INV. B41M3/14 G09F B41M3/14 G09F13/20 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) G06K G07D B42D B41M G09F 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. χ US 2008/121815 A1 (AGRAWAL SATISH [US] ET 1-20 AL) 29 May 2008 (2008-05-29) paragraphs [0002], [0032], [0033], [0057], [0079], [0083], [0084], [0109]; claims 1, 2, 7, 9, 26, 28; figures Χ US 2008/121818 A1 (AGRAWAL SATISH [US] ET 1-20 AL) 29 May 2008 (2008-05-29) cited in the application paragraphs [0029], [0051], [0052], [0078], [0094], [0104], [0105]; figures US 2008/185557 A1 (AGRAWAL SATISH [US] ET AL) 7 August 2008 (2008-08-07) χ 1-20 cited in the application paragraphs [0050], [0097]; claims 32,35-44; figures -/--Х X Further documents are listed in the continuation of Box C. See patent family annex. Special categories of cited documents: "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 "A" document defining the general state of the art which is not considered to be of particular relevance invention earlier document but published on or after the international "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to filing date 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) involve an inventive step when the document is taken alone "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 docu-"O" document referring to an oral disclosure, use, exhibition or ments, such combination being obvious to a person skilled in the art. other means document published prior to the international filing date but later than the priority date claimed "&" document member of the same patent family Date of the actual completion of the international search Date of mailing of the international search report 15 April 2011 28/04/2011 Name and mailing address of the ISA/ Authorized officer European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016 Cametz, Cécile

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT					
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.			
X X	FR 2 484 922 A1 (GAO GES AUTOMATION ORG [DE]) 24 December 1981 (1981-12-24) page 4, line 11 - line 19 page 5, line 36 - page 6, line 14 page 6, line 34 - page 7, line 5 claims 1,2,4,9,17,18	Relevant to claim No.			
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INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family Publication member(s) date	
US 2008121815 A	29-05-2008	AU 2007355579 A1 CA 2663425 A1 EP 2066455 A1 JP 2010507839 T KR 20090082180 A WO 2009002329 A1	31-12-2008 31-12-2008 10-06-2009 11-03-2010 29-07-2009 31-12-2008
US 2008121818 A	29-05-2008	AU 2007347806 A1 CA 2663427 A1 EP 2069461 A2 JP 2010503752 T KR 20090084810 A WO 2008105830 A2	04-09-2008 04-09-2008 17-06-2009 04-02-2010 05-08-2009 04-09-2008
US 2008185557 A	. 07-08-2008	AU 2005319365 A1 CA 2591803 A1 EP 1833943 A2 JP 2008524401 T SG 159492 A1 US 2011012062 A1 WO 2006069028 A2	29-06-2006 29-06-2006 19-09-2007 10-07-2008 30-03-2010 20-01-2011 29-06-2006
FR 2484922 A	. 24-12-1981	CH 659099 A5 DE 3020652 A1 WO 8103508 A1 EP 0053124 A1 ES 8204667 A1 GB 2089383 A IT 1144578 B JP 2012196 B JP 57500919 T SE 448387 B SE 8107668 A US 4451530 A	31-12-1986 10-12-1981 10-12-1981 09-06-1982 16-08-1982 23-06-1982 29-10-1986 19-03-1990 27-05-1982 16-02-1987 21-12-1981 29-05-1984