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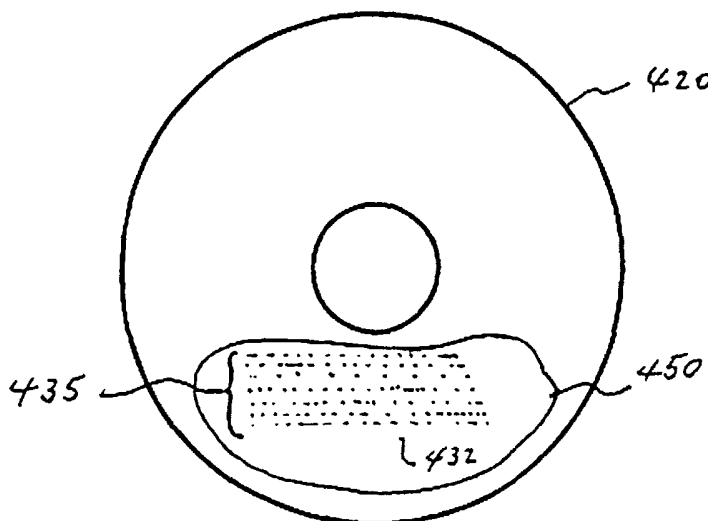
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[Continued on next page]

(54) Title: MARKING ARTICLES USING A COVERT DIGITALLY WATERMARKED IMAGE



(57) Abstract: A marking system that includes forming at least one marking in or on an article (420), wherein the image formed is not visible to the unaided human observer, and further contains at least one digital watermark (435). The digitally watermarked image comprises emissive and photoabsorptive portions. The digitally watermarked image is applied using a substance reactive to a predetermined excitation source, and exposure to ultraviolet light. Other traditional techniques, such as printing with fluorescent inks may be used in combination. The digitally watermarked image is subsequently observable upon exposure to the predetermined excitation source. The digitally watermarked image may be observed and decoded by appropriately configured detection systems (400), wherein the information obtained may be used for purposes including, but not limited to, authentication and security of the article or information contained within the article.



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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/US02/17868

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : G06K 19/06, 7/10; G08C 21/00
 US CL : 235/491, 468, 462.06, 462.34, 492, 493, 494

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)
 U.S. : 235/491, 468, 462.06, 462.34, 492, 493, 494

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
 NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
 USPTO APS EAST

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y,P ---	US 6,354,501 B1 (OUTWATER et al) 12 March 2002 (12.03.02), column 2, lines 51+.	1, 8, 15, 22, 28
A,P		----- 2-7,9-14,16-21,23- 27,29-37
X,P ---	US 6,315,329 B1 (GREENE) 13 November 2001 (13.11.2001), column 4, lines 10+.	1, 8, 28
Y,P		----- 15, 22
X,E ---	US 6,442,276 B1 (DOLJACK) 27 August 2002 (27.08.2002) column 11, lines 49+.	1
Y,E		----- 8, 15, 22, 28
A,E	US 6,458,294 B2 (OSHIMA et al) 01 October 2002 (01.10.2002), column 1, lines 47+.	1, 8, 15, 22, 28
X ---	US 4,678,898 A (RUDLAND) 07 July 1987 (07.07.1987), column 2, lines 18+.	1
Y		----- 8, 15, 22, 28

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

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INTERNATIONAL SEARCH REPORT

International application No.

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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	US 4,538,059 A (RUDLAND) 27 August 1985 (27.08.1985), abstract.	1
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Y		8, 15, 22, 28
A	US 3,802,101 A (SCANTLIN) 09 April 1974 (09.04.1974), abstract.	1, 8, 15, 22, 28
A	US 4,889,367 A (MILLER) 26 December 1989 (26.12.198), abstract.	1, 8, 15, 22, 28
X	US 5,525,798 A (BERSON et al) 11 June 1996 (11.06.1996), abstract, column 2, lines	1, 15
---	23+.	-----
Y		8, 22, 28

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US02/17868

Box I Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)

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

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

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

Box II Observations where unity of invention is lacking (Continuation of Item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:
Please See Continuation 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.:
- Remark on Protest** The additional search fees were accompanied by the applicant's protest.
 No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US02/17868

BOX II. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1.

Group I, claims 1-7, drawn to an object comprising at least one digitally watermarked image normally invisible but that becomes detectable when exposed to a predetermined excitation source.

Group II, claims 8-14, drawn to an article comprising a first digitally watermarked image normally invisible but detectable when exposed to a predetermined excitation source, and a second digital watermarked image disposed on the article, where it is observable to the unaided observer.

Group III, claims 15-27, drawn to an article comprising a first digitally watermarked image normally invisible but detectable when exposed to a first predetermined excitation source, and at least a second digitally watermarked image normally invisible but detectable when exposed to a second predetermined excitation source.

Group IV, claims 28-37, drawn to method of examining an article having at least one digitally watermarked image normally invisible but detectable when exposed to a first predetermined excitation source, exposing the article to the source, detecting and decoding the digital watermark.

This application contains claims directed to more than one species of the generic invention. These species are deemed to lack unity of invention because they are not so linked as to form a single general inventive concept under PCT Rule 13.1.

The species are as follows:

Group I - Figs 1, 7A, 7B, 8, drawn to an embodiment of an article with a invisible digital watermark (page 10, lines 14-15), where the marking/watermark only appears under excitation (page 11, lines 29-31).

Group II - Fig. 10, drawn to an embodiment of an article with a visible digital watermark 435A and an invisible digital watermark 435B (page 19, lines 13+).

Group III - Figs 9, drawn to an embodiment with two invisible watermarks (page 18, lines 25+).

Group IV - Figs 5-6, drawn to embodiments for detection.

The claims are deemed to correspond to the species listed above in the following manner:

Group I: Claims 1-7

Group II: Claims 8-14

Group III: Claims 15-27

Group IV: Claims 28-37

The following claim(s) are generic: none.

The species listed as Groups 1-4 do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: Group 1 claims are drawn to an article with one invisible digital watermark, and are unique and independent to Group 2 claims which are drawn to an article with one invisible digital watermark and one visible digital watermark, Group 3 claims which are drawn to an article with one two invisible digital watermarks, and Group 4 claims which are drawn to a method of exposing, detecting, and decoding the digital watermark. This application has lack of unity because a separate search would be necessary for Groups 1-4.