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(54) Title: SYSTEMS AND METHODS FOR INFRARED DETECTION

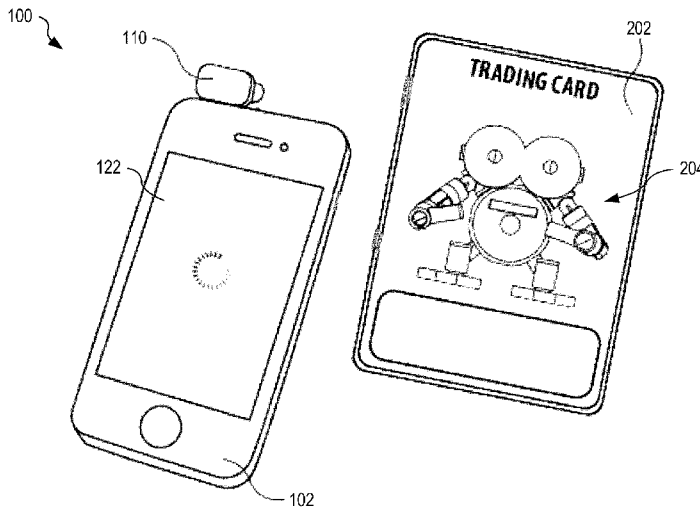


FIG. 2

(57) Abstract: A fluorescence detection system includes a light source for coupling with a mobile device and software, having machine readable instructions loadable into memory of the mobile device and executable by a processor of the mobile device, capable of: activating the light source in coordination with capturing one or more images using a camera of the mobile device; analyzing an image captured with the light source on with an image captured with the light source off, to detect a shift of intensity within a predetermined color range within the images; and identifying and authenticating objects by measuring the intensity shift within the images.



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- *with international search report (Art. 21(3))*
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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 14/41719

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - G01N 21/64, H04M 1/00 (2014.01)

CPC - G01N 21/6428, H04M 1/72522

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)
IPC(8) - G01N 21/64; H04M 1/00 (2014.01); CPC - G01N 21/6428, H04M 1/72522Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
USPC - 422/82.08, 455/556, 1, 702/40, 424/9.6; CPC - G01N 21/645, G01N21/89, A61K 49/0032Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Electronic Database Searched: Patbase, Google Patents, Google Scholar, Google Web;
Search Terms: Fluorescence, detect/identify, intensity/amplitude, light source, LED, camera, dye, infrared, filter, mobile/computer/ipod/ipad/iphone, display/screen ON/OFF, flash, authentication, etc.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2011/0117025 A1 (Dacosta et al.) 19 May 2011 (19.05.2011); entire document, especially, Abstract, FIG. 1, 2, para [0070]-[0075], [0081]-[0083], [0085], [0088], [0089]	1-10
A	US 2012/0157160 A1 (Ozcan et al.) 21 June 2012 (21.06.2012); entire document, especially para [0045],[0047],[0062],[0063]	1-10
A	WO 2002/061405 A2 (Dickson et al.) 14 November 2002 (14.11.2002); entire document	1-10
A	EP 1912059 A1 (Se) 16 April 2008 (16.04.2008); entire document	1-10
A	WO 2013/003815 A2 (Strongin et al.) 03 January 2013 (03.01.2013); entire document	1-10
A,P	US 2013/0157351 A1 (Ozcan et al.) 20 June 2013 (20.06.2013); entire document	1-10

 Further documents are listed in the continuation of Box C.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"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)

"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

"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

"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

"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

"&" document member of the same patent family

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 14/41719

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:
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 1-10 directed to a fluorescence detection system.

Group II: Claim 11 directed to a near-IR filter array layer for an electromagnetic sensor array.

Group III: Claims 12-20 directed to a 3D printer with a filament authentication method.

--See continuation on Supplemental Page ---

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 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.:
1-10

- 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.

Continuation of Box No. III -

The inventions listed as Groups I-III 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 technical features for the following reasons:

Groups II-III do not include the special technical feature of identifying and authenticating an object by measuring an intensity shift in images captured by a camera of a mobile device of Group I.

Groups I and III do not include the special technical feature of a plurality of infrared filters of Group II.

Groups I-II do not include the special technical feature of a 3D printer of Group III.

Groups I and III share the technical features of a light source, activating the light source, and authenticating an object based upon a detected response to the light source. However, this does not provide a contribution over prior art as this technical feature is anticipated by US 2012/0157160 A1 to Ozcan et al. (hereinafter Ozcan). Ozcan discloses of a light source (light source 24), activating the light source (para. [0045]), and authenticating an object (sample 32) based upon a detected response to the light source (para. [0062]-[0063]).

Groups I and II share the technical feature of a filter. However, this does not provide a contribution over prior art as this technical feature is anticipated by Ozcan. Ozcan discloses of a light source, activating the light source, and authenticating an object based upon a detected response to the light source (filters 42, para. [0047]).

Groups I though III therefore lack unity under PCT Rule 13 because they do not share a same or corresponding special technical feature.