(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
16 December 2004 (16.12.2004)

PCT

(10) International Publication Number
WO 2004/109323 A3

(51) International Patent Classification[7]: G01S 7/495, 7/36

(21) International Application Number:
PCT/IL2004/000475

(22) International Filing Date: 3 June 2004 (03.06.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

156313	4 June 2003 (04.06.2003)	IL
156897	13 July 2003 (13.07.2003)	IL
60/539,599	29 January 2004 (29.01.2004)	US

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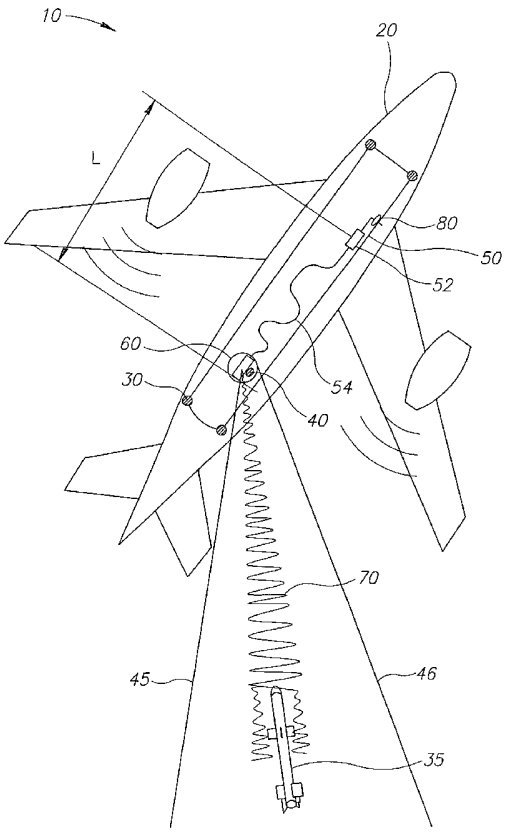
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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM,

[Continued on next page]

(54) Title: FIBER LASER BASED DIRECTIONAL INFRARED COUNTERMEASURE (DIRCM) SYSTEM



(57) Abstract: A DIRCM (Direct IR Counter Measures) system is described that includes a detection and warning means for detecting a missile that might pose a threat on the platform to which said system is allocated, and generating a warning of its existence. The warning may include data that enable the calculation of the expected direction from which the missile is approaching. The DIRCM system may also include acquisition means for performing acquisition of the approaching missile in accordance with the data provided by the detection and warning means, and issuing data that may enable the calculation in real time of the updated position of the missile, a fiber laser means for generating a laser beam, and a motion and aiming enabled turret means, coupled with the laser means, for directing the laser beam unto the approaching missile. The laser beam may be generated in accordance with the missile's updated position as calculated based on the data received from the acquisition means, and processing means, linked to the detection and warning means, and also to the acquisition means, the laser means and the turret means.

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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, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, 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, IT, LU, 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:
10 March 2005

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

Int onal Application No
PCT/IL2004/000475

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G01S7/495 G01S7/36

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 7 G01S

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, WPI Data, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	DE 44 02 855 A1 (DIEHL GMBH & CO) 3 August 1995 (1995-08-03) column 1, line 1 - column 2, line 15 column 3, line 5 - column 5, line 14 figures 1-3,5	1-42
Y	US 2003/021529 A1 (KOPLOW JEFF) 30 January 2003 (2003-01-30) paragraphs '0051!, '0074!, '0076!, '0085!	1-19, 27-29, 32-37, 39-42

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
17 December 2004	17. 01. 2005

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, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Hirsch, S

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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.
Y	MCMANAMON P F ET AL: "Suggestions for low cost multifunction sensing" AEROSPACE CONFERENCE, 1998 IEEE SNOWMASS AT ASPEN, CO, USA 21-28 MARCH 1998, NEW YORK, NY, USA,IEEE, US, 21 March 1998 (1998-03-21), pages 283-307, XP010287019 ISBN: 0-7803-4311-5 columns 1-4 columns 15-19 columns 23-36 figures 1-3,7 tables 11-13	1-8, 14-19, 36,39-42
Y	EP 1 241 486 A (BODENSEEWERK GERAETETECH) 18 September 2002 (2002-09-18) paragraphs '0002!, '0003!, '0008!, '0009!, '0012!, '0015!, '0022!, '0023!, '0025! figure 1	1-8, 14-19, 36,39-42
Y	US 2002/153497 A1 (JONES DENNIS C ET AL) 24 October 2002 (2002-10-24) paragraphs '0001! - '0009! paragraphs '0017! - '0035! paragraphs '0038! - '0040! figures 2-4	1-8, 14-19, 36,39-42
Y	SANGHERA J S ET AL: "Active and passive chalcogenide glass optical fibers for IR applications: a review" JOURNAL OF NON-CRYSTALLINE SOLIDS, NORTH-HOLLAND PHYSICS PUBLISHING. AMSTERDAM, NL, vol. 256-257, 2 October 1999 (1999-10-02), pages 6-16, XP004364266 ISSN: 0022-3093 paragraphs '0001!, '4.1.1!, '4.2.1! tables 5, 6	11-14, 24-26,30
Y	DE 197 45 785 A (LFK GMBH) 29 April 1999 (1999-04-29) page 1, lines 3-35 page 2, lines 9-12 figure 1	38,42
Y	US 2002/154377 A1 (PEPPER DAVID M) 24 October 2002 (2002-10-24) paragraph '0002! figures 1-3	11-13, 20-23,31

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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.
Y	BUSSE L E ET AL: "Mid-infrared power delivery through chalcogenide glass cladded optical fibers" SPIE, vol. 2714, 1996, pages 211-221, XP002311174 tables 1,2	11-13, 20,21,31
Y	SANGHERA J S ET AL: "IR fiber optics development at the Naval Research Laboratory" PROCEEDINGS OF THE SPIE, vol. 3950, 2000, pages 180-185, XP002311175 page 180; figure 1	11-13, 24-26,30
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A	SHAW L B ET AL: "Development of IR Emitting Infrared Fibers at the Naval Research Laboratory" PROCEEDINGS OF SPIE, vol. 4366, 2001, pages 90-95, XP002311177 the whole document	9-13, 20-25, 37,38
A	BUSSE L E ET AL: "Mid-IR high power transmission through chalcogenide fibers: current results and future challenges" SPIE, vol. 2966, 1997, pages 553-563, XP002311178 the whole document	9-13, 20-25, 37,38

INTERNATIONAL SEARCH REPORT

national application No.
PCT/IL2004/000475

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.:
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 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.:

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

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

1. claims: 1-8, 14-19, 36, 39-42

   DIRCM system with fiber laser source.

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2. claims: 9-13, 20-35, 37, 38

   Design of a fiber laser source.

INTERNATIONAL SEARCH REPORT

Information on patent family members

Int ɔnal Application No
PCT/IL2004/000475

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