

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
12 August 2004 (12.08.2004)

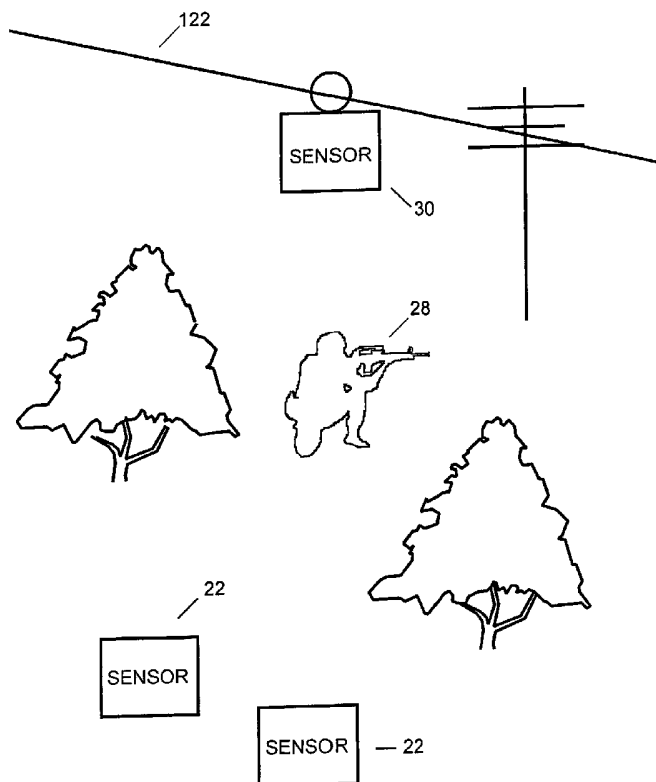
PCT

(10) International Publication Number
WO 2004/068162 A3

- (51) International Patent Classification⁷: **G01S 5/20**, 7/539, 5/00, 5/14
- (74) Agent: **HOLMES, Fred, H.**; Fellers, Snider, Blankenship, Bailey & Tippens, P.C., Suite 800, 321 South Boston, Tulsa, OK 74103-3318 (US).
- (21) International Application Number: PCT/US2004/002036
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, 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.
- (22) International Filing Date: 22 January 2004 (22.01.2004)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data: 10/248,511 24 January 2003 (24.01.2003) US
- (71) Applicants and
- (72) Inventors: **PATTERSON, Frank, Jr.** [US/US]; Route 1, Box 121, Woodward, OK 73801 (US). **BAXTER, Kevin, C.** [US/US]; 5521 Cleon Ave., North Hollywood, CA 91601 (US). **HOLMES, Fred, H.** [US/US]; Route 3, Box 79, Cleveland, OK 74020 (US).
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, 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, PT, RO, SE, SI, SK,

[Continued on next page]

(54) Title: SYSTEM AND METHOD FOR IDENTIFYING AND LOCATION AN ACOUSTIC EVENT (SNIPER)



(57) Abstract: A system and method for detecting, identifying, and fixing the location of the source of an acoustic event. The inventive system includes: a plurality of sensors dispersed at somewhat regular intervals throughout a monitored area; a communication network adapted to deliver information from the sensors to a host processor; and a process within the host processor for determining, from the absolute times of arrival of an event at two or more sensors, a position of the source of the event. Acoustic events are detected and analyzed at each sensor so that the sensor transmits over the network: an identifier for the sensor; an identifier for the type of event; and a precise absolute time of arrival of the event at the sensor. In a preferred embodiment, the system also identifies the type of weapon firing a gunshot.

WO 2004/068162 A3



TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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.

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:

16 December 2004

INTERNATIONAL SEARCH REPORT

Application No
/US2004/002036

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G01S5/20 G01S7/539 G01S5/00 G01S5/14

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 G01V

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, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US H1 916 H (HOLLANDER SAMUEL) 7 November 2000 (2000-11-07) column 2, line 12 - column 7, line 42; figures 1,5,6	1-5,7-13
X	WO 00/73811 A (GTE INTERNETWORKING INC) 7 December 2000 (2000-12-07)	1-5,7-13
A	page 8, line 29 - page 11, line 31; figures 1,2A,8A,8,12A,12B page 35, line 9 - page 40, line 29	6
X	US 5 504 717 A (BELT RONALD A ET AL) 2 April 1996 (1996-04-02) the whole document	1-5,7-13
	----- -/-	

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

* 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 document 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

Date of the actual completion of the international search

7 June 2004

Date of mailing of the international search report

07. 10. 2004

Name and mailing address of the ISA

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

Authorized officer

Mercier, F

INTERNATIONAL SEARCH REPORT

International Application No
/US2004/002036

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	LEWIS G ET AL: "Urban gunshot and sniper location: technologies and demonstration results" SENSORS, AND COMMAND, CONTROL, COMMUNICATIONS, AND INTELLIGENCE (C3I) TECHNOLOGIES FOR HOMELAND DEFENSE AND LAW ENFORCEMENT, ORLANDO, FL, USA, 1-5 APRIL 2002, vol. 4708, 1 April 2002 (2002-04-01), pages 315-323, XP002282657 Proceedings of the SPIE - The International Society for Optical Engineering, 2002, SPIE-Int. Soc. Opt. Eng, USA ISSN: 0277-786X page 315 - page 322	1-5,7-13
A	page 319; figure 7	6
A	----- US 4 792 806 A (BENT RODNEY B ET AL) 20 December 1988 (1988-12-20) column 20, line 27 - column 20, line 67	12
A	----- US 4 855 671 A (FERNANDES ROOSEVELT A) 8 August 1989 (1989-08-08) column 6, lines 29-54; figures 3,5,11B	6
A	----- WO 98/20468 A (FOSTER MILLER INC) 14 May 1998 (1998-05-14) page 7, line 15 - page 16, line 5; figures 2,3	6
A	----- US 5 973 998 A (DUNHAM JASON W ET AL) 26 October 1999 (1999-10-26) cited in the application the whole document	1-13

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2004/002036

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.:

see annex

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: 1-13

The first group of claims 1-13 comprises 3 independent claims 1,10,13

The subject matter of claim 1 relates to a sensor for detecting and providing the absolute time of arrival of an acoustic event. The sensor of claim 1 includes a network interface for transmitting the time of detection.

Claim 10 relates to a system for locating and identifying an acoustic event, which uses a plurality of sensors (similar to the sensor defined in claim 1). Each sensor provides the absolute time of arrival of a known acoustic event to a processor via a network interface. The system includes at least 3 sensors to calculate the location of the acoustic event (dependent claim 11).

Claim 13 relates to a system for locating an acoustic event, which uses a plurality of sensors (similar to the sensor defined in claim 1). Each sensor provides the absolute time of arrival of a known acoustic event to a processor via a network interface. The system includes at least 3 sensors to calculate the location of the acoustic event by triangulation.

2. claim: 14

Second group comprises only independent claim 14

The subject matter of claim 14 relates to a method for identifying the source of a known acoustic event. The method includes the steps of

- 1) storing envelope and spectral characteristic of a known particular acoustic event.
- 2) receiving acoustic waves at a sensor
- 3) determining the envelope of the received acoustic waves
- 4) performing a first correlation in time domain and if some matching is found with the particular acoustic event then a second correlation is performed in the frequency domain for identifying that the acoustic waves were produced by an event matching the known particular acoustic event.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

/US2004/002036

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US H1916	H	07-11-2000	NONE
WO 0073811	A	07-12-2000	US 6178141 B1 23-01-2001 AU 5282900 A 18-12-2000 WO 0073811 A1 07-12-2000
US 5504717	A	02-04-1996	CA 2150322 A1 28-11-1995 US 5703835 A 30-12-1997
US 4792806	A	20-12-1988	US 4543580 A 24-09-1985
US 4855671	A	08-08-1989	US 4689752 A 25-08-1987 US 4758962 A 19-07-1988 AT 44095 T 15-06-1989 AT 29075 T 15-09-1987 AT 64659 T 15-07-1991 AT 67037 T 15-09-1991 AT 64471 T 15-06-1991 CA 1258094 C 01-08-1989 CA 1251260 A1 14-03-1989 CA 1258094 A2 01-08-1989 CA 1258095 A2 01-08-1989 CA 1258096 A2 01-08-1989 CA 1258097 A2 01-08-1989 CA 1258098 A1 01-08-1989 DE 3465522 D1 24-09-1987 DE 3478717 D1 20-07-1989 DE 3484715 D1 18-07-1991 DE 3484739 D1 25-07-1991 DE 3485028 D1 10-10-1991 EP 0125050 A1 14-11-1984 EP 0125796 A1 21-11-1984 EP 0218220 A2 15-04-1987 EP 0218221 A2 15-04-1987 EP 0218222 A2 15-04-1987 EP 0218223 A2 15-04-1987 EP 0218224 A2 15-04-1987 EP 0218225 A2 15-04-1987 JP 1058739 B 13-12-1989 JP 1575264 C 24-08-1990 JP 60043035 A 07-03-1985 JP 60046417 A 13-03-1985 JP 1050304 B 27-10-1989 JP 1566025 C 25-06-1990 JP 63114536 A 19-05-1988 JP 1050305 B 27-10-1989 JP 1566026 C 25-06-1990 JP 63121437 A 25-05-1988 JP 1050306 B 27-10-1989 JP 1566027 C 25-06-1990 JP 63133844 A 06-06-1988 JP 1050307 B 27-10-1989 JP 1566028 C 25-06-1990 JP 63114537 A 19-05-1988 US 4829298 A 09-05-1989 US 4799005 A 17-01-1989 US 4777381 A 11-10-1988 US 4794327 A 27-12-1988

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

/US2004/002036

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4855671	A	US 4796027 A	03-01-1989
		US 4635055 A	06-01-1987
		US 4808917 A	28-02-1989
<hr/>			
WO 9820468	A	14-05-1998	AU 725071 B2
			05-10-2000
			AU 5097498 A
			29-05-1998
			BR 9706912 A
			04-01-2000
			CA 2241837 A1
			14-05-1998
			CA 2402600 A1
			14-05-1998
			CN 1210605 A
			10-03-1999
			EP 0875052 A1
			04-11-1998
			JP 11502313 T
			23-02-1999
			JP 3288389 B2
			04-06-2002
			NZ 330821 A
			25-10-2002
			WO 9820468 A1
			14-05-1998
<hr/>			
US 5973998	A	26-10-1999	NONE
<hr/>			