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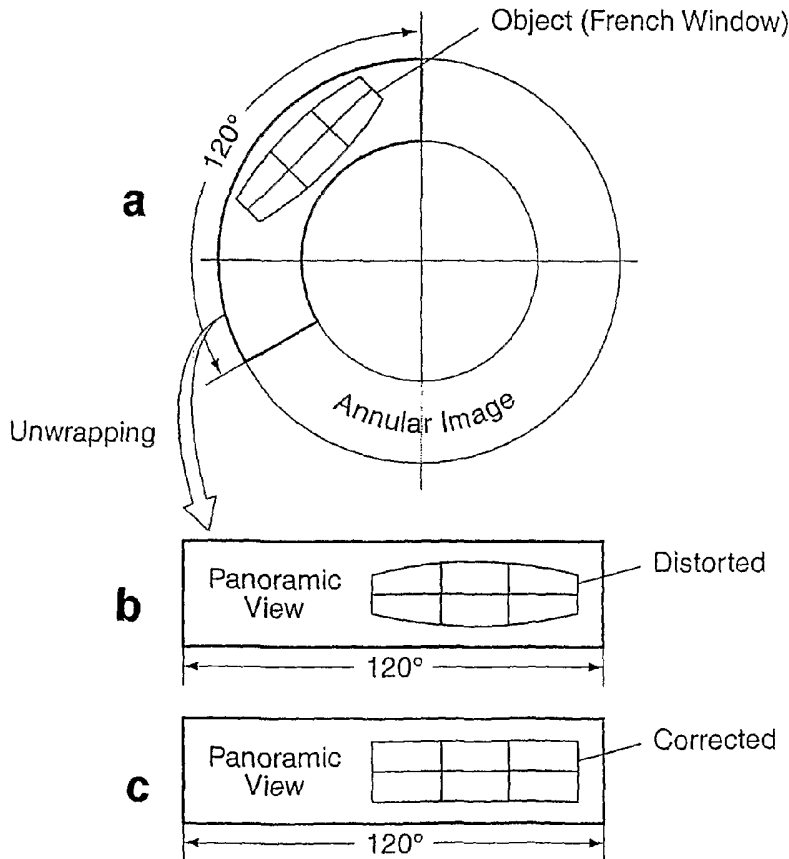
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FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE,  
SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN,  
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[Continued on next page]

(54) Title: PANORAMIC VIDEO SYSTEM WITH REAL-TIME DISTORTION-FREE IMAGING



(57) Abstract: A panoramic annular lens system (PAL), a unitary video camera and a PCbased software system that unwraps a 360° video image into a seamless, distortion free horizontal image in real time. The PAL system of the preferred embodiment has a 360° horizontal field of view and a 90° vertical field of view in a 40mm diameter compact package. The invention is not limited to any particular type of lens system. In fact, there are numerous lens systems for providing a 360° panoramic view. The video camera may be a CCD or CMOS based device having a pixel resolution of either 1280 x 1024 (high resolution) or 720 x 480 (NTSC). The unwrapping system is a radiometric ray tracing program carried out using a computer's graphics card capabilities to produce highly efficient regional transformation while minimizing software overhead. The result is real time, high resolution 30 fps conversion from a spherical distorted image to a flat panoramic image in Cartesian coordinates.

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**Declaration under Rule 4.17:**

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

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**INTERNATIONAL SEARCH REPORT**

International application No.

PCT/US04/21585

**A. CLASSIFICATION OF SUBJECT MATTER**  
 IPC: **H04N 5/225( 2006.01)**

USPC: 348/207.99,335,143  
 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. : 348/207.99,335,143

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)  
 Please See Continuation Sheet

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6,424,377 A (DRISCOLL, JR. et al) 23 July 2002 (23.07.2002), columns 4-9.	1-4, 6-12, 14-22
A	US 6,493,032 A (WALLERSTEIN et al ) 10 December 2002 (10.12.2002), columns 2 and 3.	1-22
A	US 5,790,182 A (HILAIRE) 04 August 1998 (01.08.1998.), column 3, lines 35-67 and column 4.	1-22
A	US 6,226,035 A (KOREIN et al) 01 May 2001 (01.05.2001), column 6, lines 44-67.	1-22
A	US 5,760,826 A (NAYAR) 02 June 1998 (02.06.1998), columns 5-8.	1-22

Further documents are listed in the continuation of Box C.  See patent family annex.

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

Date of the actual completion of the international search 04 March 2006 (04.03.2006)	Date of mailing of the international search report <b>06 APR 2006</b>
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**INTERNATIONAL SEARCH REPORT**

PCT/US04/21585

**Continuation of B. FIELDS SEARCHED Item 3:**

EAST

panoramic, annular, lens, focus, computer rectangular