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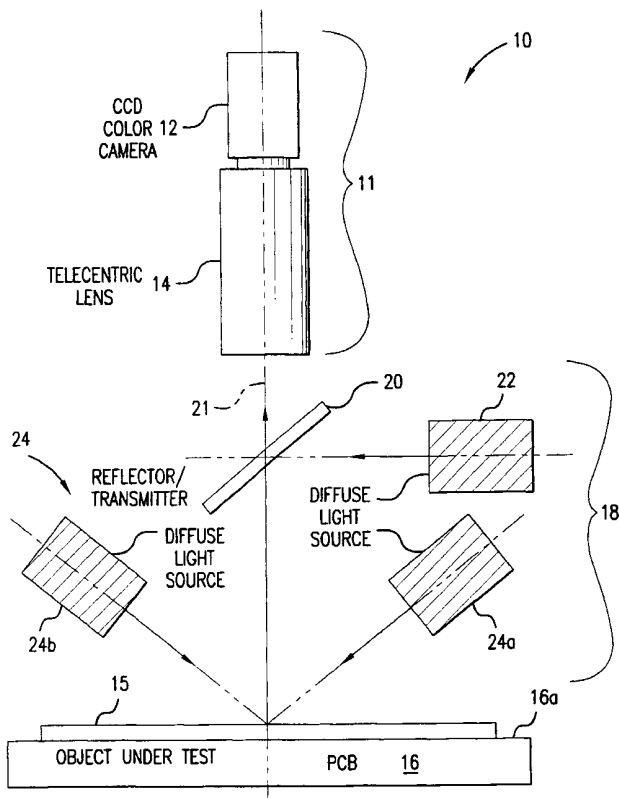
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[Continued on next page]

(54) Title: OPTICAL SYSTEM



(57) Abstract: An optical system for use in an inspection system is described. The optical system includes an imaging system which may be provided as a multi-spectral band pass image recording system and a lighting system which includes at least one coaxial light and at least one side light to provide spectral discrimination and to provide contrast between a first surface made from a first material and a second surface made from a second different material.



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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 745 236 A (HAGA KAZUMI) 28 April 1998 (1998-04-28)	1-12,31
Y	column 6, line 19 - line 58  column 7, line 57 - line 65 column 8, line 17 - line 39 column 8, line 45 - last line column 11, line 49 - column 12, line 9 column 12, line 41 - line 50 figures 2,8  --- -/--	13-15, 17, 19-21, 26-30, 32,33,41

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

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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 Y	EP 0 822 409 A (M V RESEARCH LIMITED) 4 February 1998 (1998-02-04) column 2, line 3 - line 8	34-40, 42,44,46 17,27, 30,41
	column 2, line 22 - line 25 column 5, line 24 - line 28 column 5, line 40 - line 43 figure 4	
Y  A	--- US 5 982 493 A (LEBEAU CHRISTOPHER JOHN ET AL) 9 November 1999 (1999-11-09)  abstract column 2, line 12 - line 24 column 2, line 47 -column 3, line 44 figure 1	13-15, 19-21, 28,29, 32,33 2
Y	--- US 5 187 611 A (WHITE TIMOTHY P ET AL) 16 February 1993 (1993-02-16) figure 6 column 5, line 1 - line 12 column 6, line 9 - line 17	26
A	--- WO 00 10114 A (ACUITY IMAGING LLC) 24 February 2000 (2000-02-24) figure 10 page 14, last paragraph -page 15, paragraph 2 page 28, paragraph 2	25,45
A	--- US 5 684 530 A (WHITE TIMOTHY PETER) 4 November 1997 (1997-11-04) column 13, line 45 - line 57 column 12, line 30 - line 41 -----	1,15,34, 41

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 01/19987

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
US 5745236	A	28-04-1998	JP	7325036 A	12-12-1995
EP 0822409	A	04-02-1998	IE	960563 A1	11-02-1998
			EP	0822409 A2	04-02-1998
			US	6151407 A	21-11-2000
US 5982493	A	09-11-1999	NONE		
US 5187611	A	16-02-1993	NONE		
WO 0010114	A	24-02-2000	US	6201892 B1	13-03-2001
			AU	5471599 A	06-03-2000
			EP	1127329 A1	29-08-2001
			WO	0010114 A1	24-02-2000
US 5684530	A	04-11-1997	US	5461417 A	24-10-1995
			AU	6254394 A	14-09-1994
			DE	69415965 D1	25-02-1999
			DE	69415965 T2	09-09-1999
			EP	0685140 A1	06-12-1995
			JP	8510053 T	22-10-1996
			SG	52227 A1	28-09-1998
			WO	9419908 A1	01-09-1994