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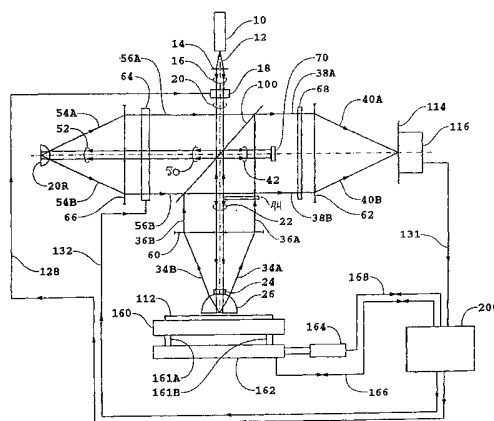
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(54) Title: DIFFERENTIAL INTERFEROMETRIC SCANNING NEAR-FIELD CONFOCAL MICROSCOPY



(57) Abstract: An interferometric optical microscopy system for imaging an object, the system including: a measurement beam mask array having an array of aperture pairs positioned to receive radiation emitted from the object in response to a measurement beam, radiation emerging from the array of aperture pairs defining a measurement return beam; a reference beam source array positioned to receive a reference beam, the reference beam source array comprising an array of elements each configured to radiate a portion of the reference beam, the radiated reference beam portions defining a reference return beam; and imaging optics positioned to direct the measurement and reference return beams to the photo-detector and configured to produce overlapping conjugate images of the array of reference elements and the array of apertures, wherein the conjugate image for each aperture pair overlaps with the conjugate image of a corresponding reference element, wherein the imaging optics include a pinhole array positioned in the conjugate image plane, the pinhole array having an array of pinholes each aligned with a corresponding aperture pair image, and wherein the measurement and reference beams are derived from a common source.



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B. FIELDS SEARCHED		
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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)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4 659 429 A (LEWIS AARON ET AL) 21 April 1987 (1987-04-21) column 2, line 29 -column 3, line 36 column 3, line 50 -column 4, line 41 column 5, line 18-50 column 6, line 40-52; figure 1 column 8, line 57 -column 9, line 12 column 10, line 41-44 --- -/--	29-32, 34,36
<input checked="" type="checkbox"/> Further documents are listed in the continuation of box C.		
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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	WO 99 63300 A (ZETETIC INST) 9 December 1999 (1999-12-09) page 29, line 24 -page 35, line 14 page 36, line 18 -page 37, line 8 page 83, line 6-10,18-22 figure 1F page 96, line 8 -page 97, line 32 page 103, line 24 -page 104, line 14 page 171, line 12,13 page 195, line 25-30 page 198, line 7-13; figure 7 page 203, line 15-22 page 204, line 30 -page 206, line 20 claim 1	29-32, 34,36
A		1-5, 13-20, 22,23, 26,28,33
A	--- EP 0 491 289 B (HELL STEFAN) 3 April 1996 (1996-04-03) column 4, line 20 -column 5, line 12 column 6, line 37 -column 7, line 43 claims 1,2,4-6	6
A	--- US 5 760 901 A (HILL HENRY A) 2 June 1998 (1998-06-02) claims 1,3,4,6,9	1-5, 13-20, 22,23, 26, 28-34,36

INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 4659429	A	21-04-1987	US 4662747 A	05-05-1987
WO 9963300	A	09-12-1999	US 6091496 A	18-07-2000
			CN 1309759 T	22-08-2001
			EP 1084378 A1	21-03-2001
			JP 2002517710 T	18-06-2002
			WO 9963300 A1	09-12-1999
			CN 1351705 T	29-05-2002
			EP 1161654 A1	12-12-2001
			WO 0055572 A1	21-09-2000
EP 0491289	B	24-06-1992	DE 4040441 A1	02-07-1992
			AT 136373 T	15-04-1996
			DE 59107650 D1	09-05-1996
			EP 0491289 A1	24-06-1992
US 5760901	A	02-06-1998	CN 1249810 T	05-04-2000
			EP 1012535 A1	28-06-2000
			JP 2001513191 T	28-08-2001
			US 6091496 A	18-07-2000
			WO 9835204 A1	13-08-1998