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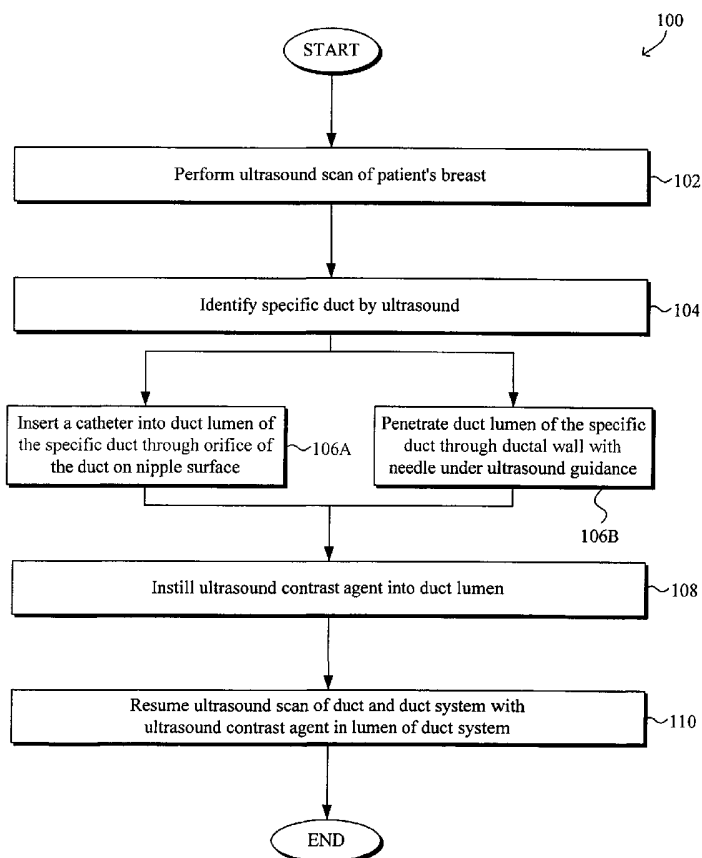
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- (21) International Application Number: PCT/US02/28844 (74) **Agent: KUO, Jung-hua**; Attorney at Law, P.O. Box 3275, Los Altos, CA 94024 (US).
- (22) International Filing Date:
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- (26) Publication Language: English
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60/322,634 12 September 2001 (12.09.2001) US
10/167,017 11 June 2002 (11.06.2002) US
- (71) **Applicant: MANOA MEDICAL, INC.** [US/US]; 1017 El Camino PMB 361, Redwood City, CA 94063 (US).

[Continued on next page]

(54) **Title: ULTRASOUND IMAGING OF BREAST TISSUE USING ULTRASOUND CONTRAST AGENT**



(57) **Abstract:** A system and method for ultrasound imaging of breast tissue by injecting an ultrasound contrast agent into a duct lumen of a patient's breast to enhance the imaging of one or more ducts within a specified lobe of the breast to improve characterization of a lesion or lesions within the duct system of the specified lobe are disclosed. The ultrasound contrast agent used to improve breast imaging may be injected into the duct lumen through an orifice on the nipple and/or a duct wall into the duct lumen. The ultrasound contrast agent may be injected prior to and/or during ultrasound imaging. The ultrasound contrast agent may be an acoustically detectable gas such as a halogenated hydrocarbon, halogenated alkane gases, nitrogen, helium, argon and/or xenon. The halogenated alkane gas may be a perfluorinated hydrocarbon such as saturated perfluorocarbon, unsaturated perfluorocarbon, and/or cyclic perfluorocarbon. The acoustically detectable gas may alternatively be mixed in a liquid solution.



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

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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

International Application No

PCT/US 02/28844

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A61B8/00

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 A61B

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, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 99 32034 A (MARSDEN JOHN CHRISTOPHER ;ERIKSEN MORTEN (NO); FRIGSTAD SIGMUND (N) 1 July 1999 (1999-07-01) page 3, line 29 -page 4, line 20 page 9, line 13 -page 12, line 32 ---	1-8
X	WO 01 12071 A (OTTOBONI THOMAS B ;POINT BIOMEDICAL CORP (US); YAMAMOTO RONALD K () 22 February 2001 (2001-02-22) page 5, line 27 -page 6, line 7 ---	1-8
P,X	WO 01 66016 A (SCIMED LIFE SYSTEMS INC) 13 September 2001 (2001-09-13) page 4, line 6 - line 22 page 19, line 6 -----	1-8

☐ 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

16 December 2002

Date of mailing of the international search report

08/01/2003

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 02/28844

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9932034	A	01-07-1999	AU 1677199 A	12-07-1999
			EP 1054625 A1	29-11-2000
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			JP 2001526075 T	18-12-2001
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WO 0112071	A	22-02-2001	AU 6635900 A	13-03-2001
			EP 1202671 A1	08-05-2002
			WO 0112071 A1	22-02-2001
WO 0166016	A	13-09-2001	AU 4198301 A	17-09-2001
			EP 1263325 A1	11-12-2002
			WO 0166016 A1	13-09-2001

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 02/28844

Box I Observations where certain claims were found unsearchable (Continuation of item 1 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:
Claims 1-8 are directed to a method of treatment of the human/animal body.
Nevertheless a search has been carried out and based on a system for
ultrasound imaging of breast tissue, see also description of the application
page 2, line 16-22.
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 II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

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.