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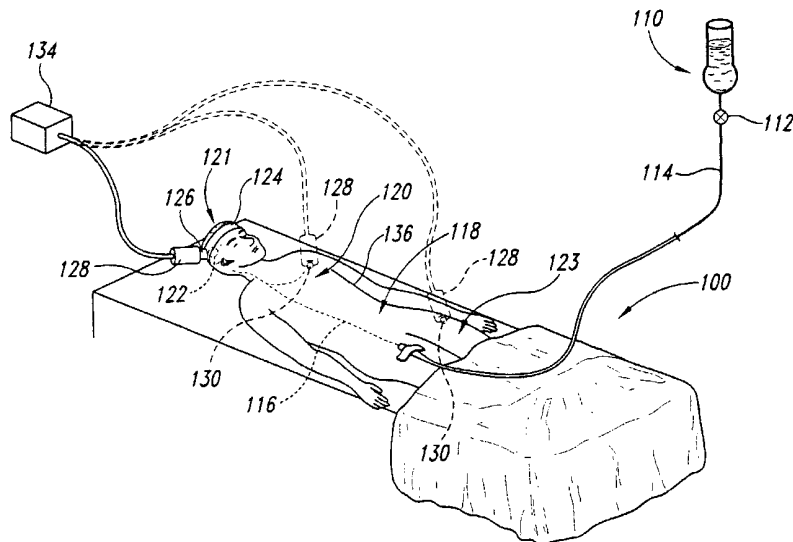
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 - (71) Applicant: SPENCER TECHNOLOGIES, INC.
[US/US]; 701 - 16th Avenue, Seattle, WA 98122 (US).
 - (72) Inventors: MOEHRING, Mark, A.: 11609 - 2nd Avenue N.W., Seattle, WA (US). VOIE, Arne, H.: 2836 N.W. 69th Street, Seattle, WA 98107 (US). SPENCER, Merrill, P.: 5219 N.E. Laurelcrest Lane, Seattle, WA 98105 (US).
 - (74) Agents: ENG, Kimton, N. et al.; Dorsey & Whitney LLP, Suite 3400, 1420 Fifth Avenue, Seattle, WA 98101 (US).
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[Continued on next page]

(54) Title: METHOD AND APPARATUS COMBINING DIAGNOSTIC ULTRASOUND WITH THERAPEUTIC ULTRASOUND TO ENHANCE THROMBOLYSIS



(57) Abstract: A method and apparatus for combining therapeutic pulsed or continuous-wave ultrasound with diagnostic pulsed ultrasound are described. In both a therapeutic mode and in a diagnostic mode, the ultrasound is administered from a single probe (128) to a patient (118) suffering from thrombosis. The ultrasound can have the same or different frequency ranges in the diagnostic and therapeutic modes. The pulsed or continuous-wave ultrasound in the therapeutic mode enhances a lysing effect of a thrombolytic agent (110). The pulsed ultrasound in the diagnostic mode allows monitoring of blood flow to locate a thrombus (122), to determine an optimal window to administer the therapeutic pulsed ultrasound, and to detect when recanalization has occurred. If an operator attends the device, a graphical display (600) operates during the diagnostic mode to display an image representative of the blood flow.



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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US01/03575

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : A61B 8/00
US CL : 600/639, 454, 459; 601/2; 604/22

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. : 600/639, 454, 459; 601/2; 604/22

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)
NONE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 5,307,816 A (HASHIMOTO et al.) 03 May 1994, see entire document.	33, 35, 36, 38, 40, 45, 46 ----- 1-22, 34, 37, 41-44, 63-65, 66, 68-83, 86
Y	US 5,720,287 A (CHAPELON et al.) 24 February 1998, see figure 8.	10, 44, 63-65, 68, 72, 73, 75, 76, 79, 80, 82, 86
Y	US 5,961,456 A (GILDENBERG) 05 October 1999, see entire document.	37, 64
Y	US 5,558,092 A (UNGER et al.) 24 September 1996, see figure 6, column 14, lines 3-9.	7, 10, 17, 18, 44, 63- 65, 68, 72-76, 79, 80, 82, 86
Y	US 5,509,896 A (CARTER) 23 April 1996, see entire document.	7, 64, 74



Further documents are listed in the continuation of Box C.



See patent family annex.

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"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		
"P" document published prior to the international filing date but later than the priority date claimed	"&"	document member of the same patent family

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Box PCT
Washington, D.C. 20231

Facsimile No. (703)305-3230

Authorized officer

RUTH S. SMITH

Telephone No. (703) 308-0858



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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	US 4,622,978 A (MATSUO et al.) 18 November 1986, see entire document.	1-5, 7, 10, 12-22, 63-65, 68, 72-76, 79, 80, 82, 86
Y	US 5,509,413 A (AKAMA et al.) 23 April 1996, see column 1, lines 16-19.	17-18
Y, P	US 6,102,860 A (MOONEY) 15 August 2000, see column 5, lines 42-48.	41-43, 69-71