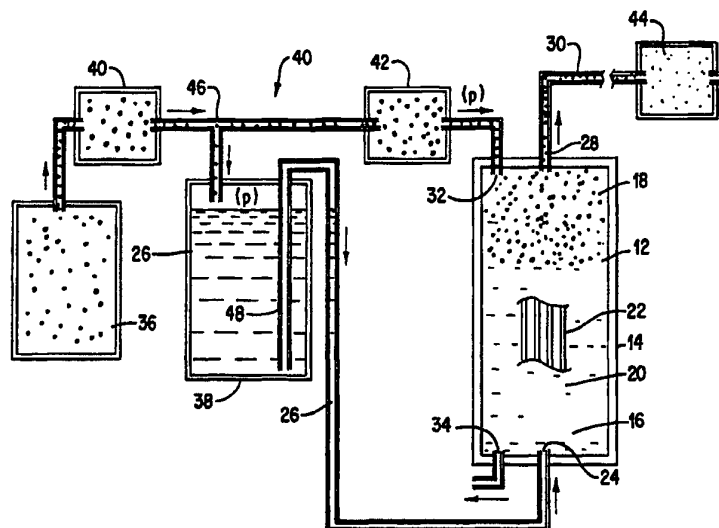




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification ⁶ : A61M 11/00, 37/00, A61K 31/00</p>	<p>A3</p>	<p>(11) International Publication Number: WO 96/41987 (43) International Publication Date: 27 December 1996 (27.12.96)</p>
<p>(21) International Application Number: PCT/US96/08424 (22) International Filing Date: 3 June 1996 (03.06.96) (30) Priority Data: 484,284 7 June 1995 (07.06.95) US (71) Applicant: WAYNE STATE UNIVERSITY [US/US]; 4043 Faculty/Administration Building, Detroit, MI 48202 (US). (72) Inventor: SPEARS, James, R.; 615 Bridle Path Court, Bloomfield Hills, MI 48304 (US). (74) Agents: STARK, Jon, R. et al.; Pennie & Edmonds, 1155 Avenue of the Americas, New York, NY 10036 (US).</p>		<p>(81) Designated States: AL, AM, AU, AZ, BB, BG, BR, BY, CA, CN, CZ, EE, FI, GE, HU, IL, IS, JP, KG, KP, KR, KZ, LK, LR, LS, LT, LV, MD, MG, MK, MN, MX, NO, NZ, PL, RO, RU, SG, SI, SK, TJ, TM, TR, TT, UA, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p>Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i></p> <p>(88) Date of publication of the international search report: 27 February 1997 (27.02.97)</p>

(54) Title: HIGH PRESSURE GAS EXCHANGER



(57) Abstract

An apparatus (10) and method for delivering a high partial pressure of a gas into a liquid. The apparatus includes a gas transfer device (12) which includes a housing (14) having upstream (16) and downstream (18) regions, between which there is located a gas liquid contacting region (20) with contacting members (22) such as hollow microporous fibers. A reservoir (36) of gas supplied gas at a high pressure (P) to a flask (38) containing gas-depleted liquid and to the gas transfer device (12). The reservoir (36) of gas provides hydrostatic pressure for urging the liquid through the contacting members (22) and propelling the gas around the contacting members (32) so that the gas does not diffuse across the contacting members. The gas-enriched liquid is then conducted to a high resistance delivery channel (44) for administration to a site of interest with effervescence, bubble formation or significant disruption of laminar flow.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US96/08424

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :A61M 11/00, 37/00; A61K 31/00

US CL :422/44, 45; 604/4, 24, 26; 261/DIG 28; 128/DIG 3

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. : 422/44, 45; 604/4, 24, 26; 261/DIG 28; 128/DIG 3

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 practicable, search terms used)

APS, CAS ONLINE, DERWENT WPIDS

SEARCH TERMS: OXYGENAT7(5A)FLUID, ?SATURATED FLUID(P)OXYGEN

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5,366,696 A (WILLIAMS) 22 November 1994.	1-14
Y	US 5,084,011 A (GRADY) 28 January 1992, Col. 4, lines 14-65.	1-14
A	US 4,968,483 A (Muller et al.) 06 November 1990.	1-14
Y	US 4,919,895 A (HELDEBRANT et al.) 24 April 1990, col. 3, lines 44-68 and col. 4, lines 1-55.	1-14
A	US, 4,686,085 A (OSTERHOLM) 11 August 1987.	1-14
A	US, 4,602,987 A (BONAVENTURA et al) 29 July 1986.	1-14
A	US 4,493,692 A (REED) 15 January 1985.	1-14

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

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Date of the actual completion of the international search 17 DECEMBER 1996	Date of mailing of the international search report 21 JAN 1997
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer N. BHAT <i>N. Bhat</i> Telephone No. (703) 308-0651

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US96/08424

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 26 49 126 A (LINDE AG) 03 May 1978.	1-14