

[54] **PROCESSES FOR EXTRACTING OXYGEN FROM FLUIDS USING IMMOBILIZED HEMOGLOBIN**

4,064,118 12/1977 Wong 424/177

[75] Inventors: **Joseph Bonaventura; Celia Bonaventura**, both of Beaufort, N.C.

[73] Assignee: **Duke University**, Durham, N.C.

[21] Appl. No.: **372,338**

[22] Filed: **Apr. 27, 1982**

Related U.S. Application Data

[62] Division of Ser. No. 196,036, Oct. 10, 1980, Pat. No. 4,343,715.

[51] Int. Cl.³ **C01B 13/00**

[52] U.S. Cl. **23/293 R; 55/68; 210/321.4**

[58] Field of Search **424/177; 423/579; 55/68; 210/321.4; 422/48, 122; 23/293 R**

[56] **References Cited**

U.S. PATENT DOCUMENTS

3,925,344 12/1975 Mazur 424/177
 4,053,590 10/1977 Bensen et al. 424/177
 4,061,736 12/1977 Morris et al. 424/177

OTHER PUBLICATIONS

Lampe et al., "Der Einflub der Immobilisierung Von Hämoglobin auf dessen Sauerstoffbindung," Acta Biol. Med. Germ., Band 34, Seite 359-363 (1975).

Lampe et al., "Untersuchungen zur Bindung Von Sauerstoff an Trägerfixiertes Hämoglobin," Studia Biophysica, Berlin, Band 39, 1973, Heft 1, S. 19-24, Printed in the German Democratic Republic.

Antonini et al., "Immobilized Hemoproteins," *Immobilized Enzymes*, vol. XLIV (1976), pp. 538-546, Academic Press.

Primary Examiner—Edward J. Meros

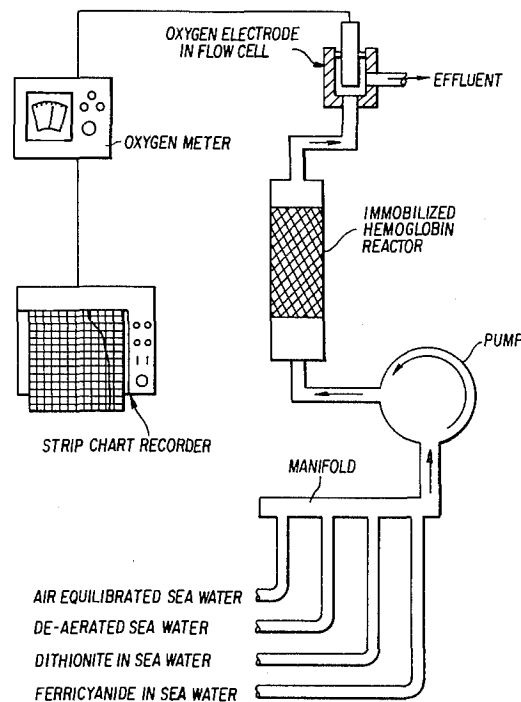
Assistant Examiner—Wayne A. Langel

Attorney, Agent, or Firm—Oblon, Fisher, Spivak, McClelland & Maier

[57] **ABSTRACT**

An oxygen carrier, capable of reversibly binding and releasing oxygen, immobilized in a polymer matrix and a method of recovering dissolved oxygen from fluids utilizing the same.

21 Claims, 13 Drawing Figures



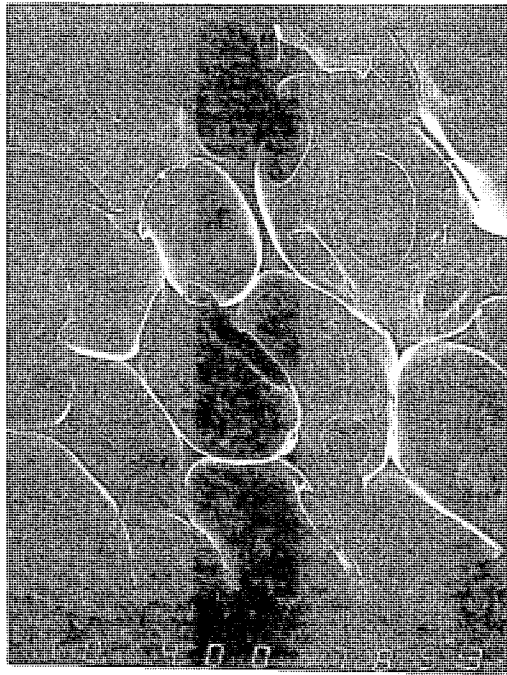


FIG. 1

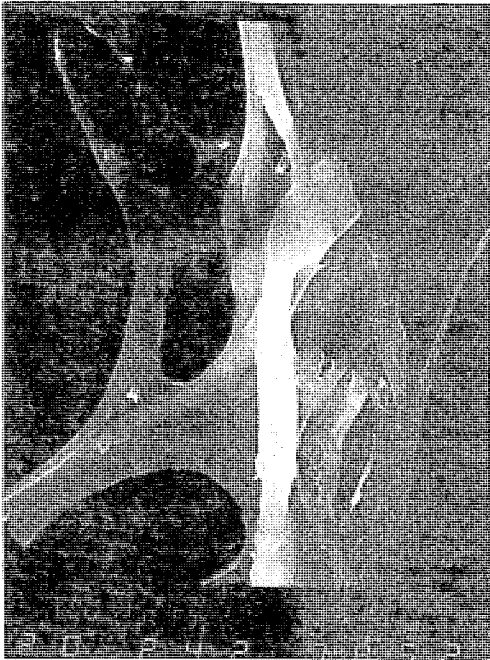


FIG. 2

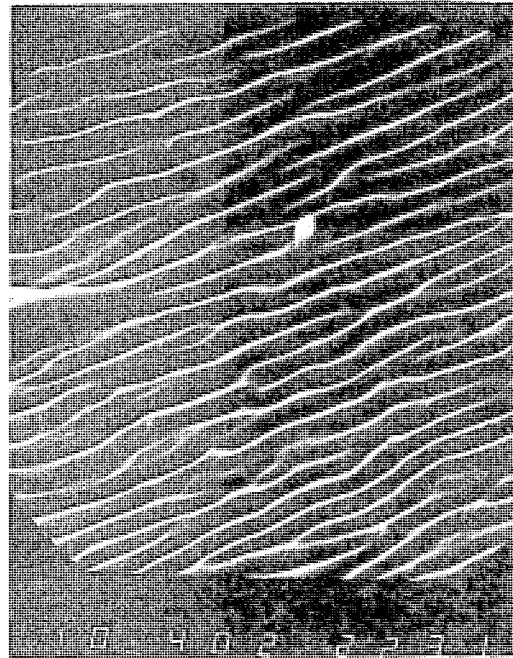
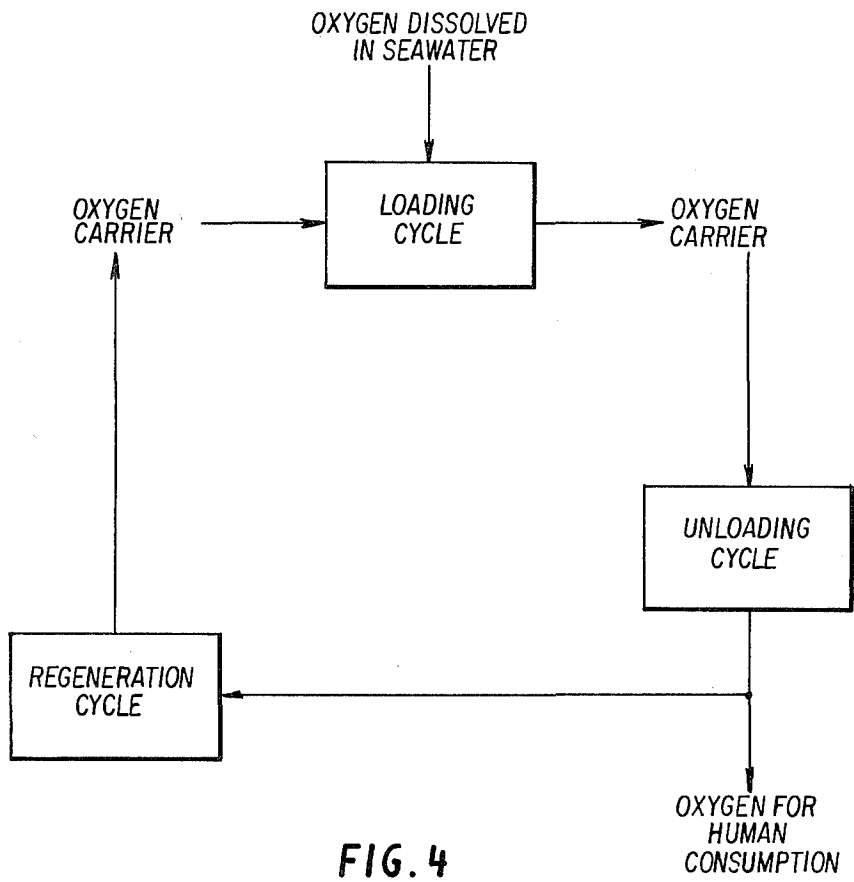


FIG. 3



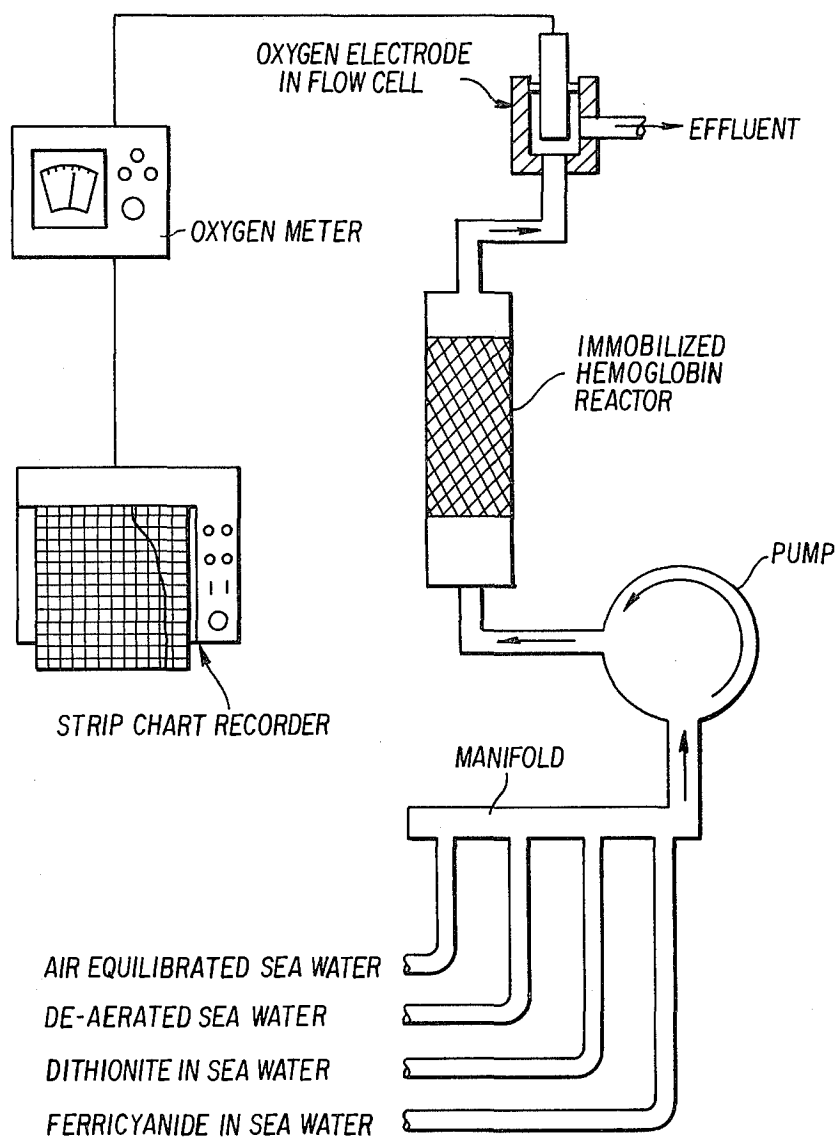
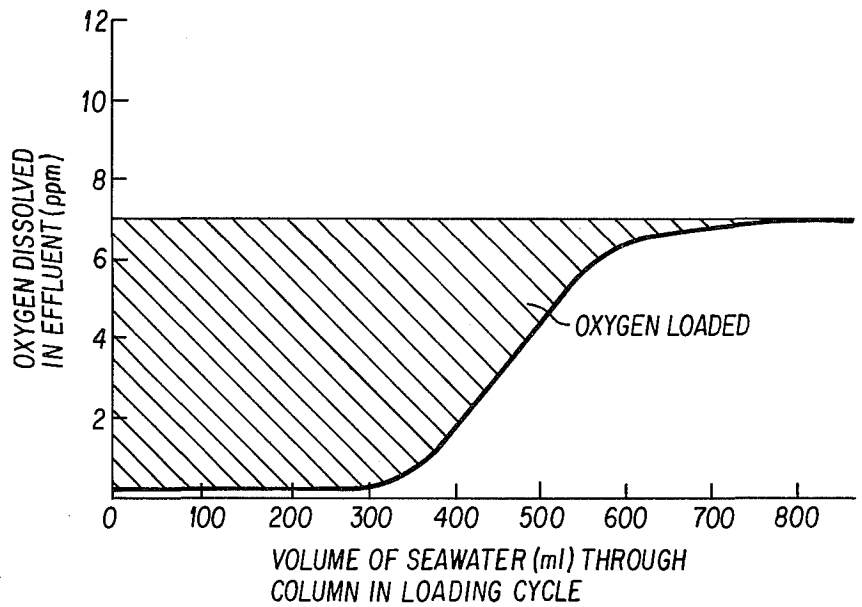


FIG. 5



MATRIX: SIZED-GEL FORMULATION OF HEMOSPONGE
 COLUMN: 75ml, 2.26g HEMOGLOBIN
 SEAWATER FLOW RATE: 26.5ml/min.
 ABSORBED OXYGEN: 2.66mg (62% OF THEORETICAL MAXIMUM)

FIG. 6

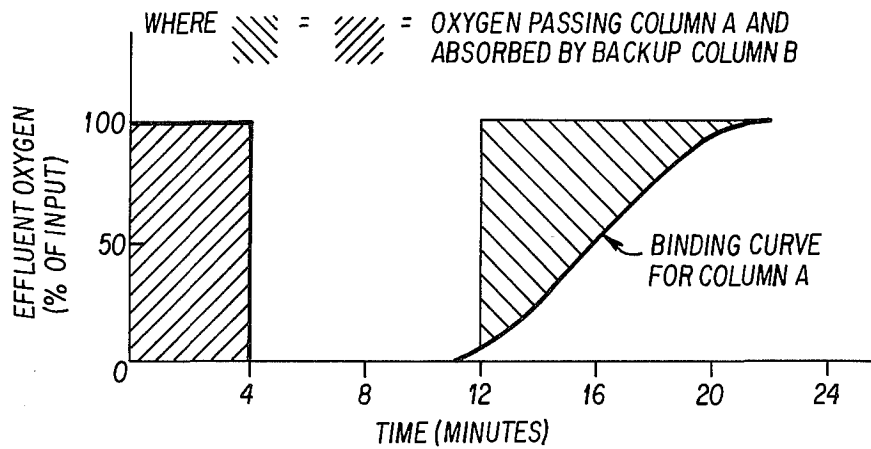


FIG. 8

Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.