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Silveri

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(54) **AMPEROMETRIC SENSOR**
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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 1001 days.

5,019,250 A 5/1991 Lorenzen
5,221,444 A 6/1993 Silveri
5,240,228 A 8/1993 Silveri
5,251,656 A 10/1993 Sexton, Sr.
5,320,748 A 6/1994 Dupuis
5,331,966 A 7/1994 Bennett et al.
5,359,769 A 11/1994 Silveri
5,389,210 A 2/1995 Silveri
5,401,373 A 3/1995 Silveri
5,422,014 A 6/1995 Allen et al.
5,441,073 A 8/1995 Hoadley
5,545,310 A 8/1996 Silveri

(Continued)

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FOREIGN PATENT DOCUMENTS

WO 2006007533 A1 1/2006

OTHER PUBLICATIONS

Innovation News 2001 article showing the Censar has been around since at least 2001. Also see Censar overview document.*

(Continued)

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See application file for complete search history.

(57) **ABSTRACT**
An amperometric sensor includes a first electrode, a second electrode and a reference electrode. The sensor further includes a switch to selectably electrically connect the first electrode as a working electrode and to electrically connecting the second electrode as an auxiliary electrode during a first time interval. During a second time interval, the switch electrically connects the first electrode as the auxiliary electrode and electrically connects the second electrode as the working electrode. The switching of the two electrodes is repeated continuously as amperometric measurements are performed. Preferably, the sensor includes an ultrasonic transducer proximate the working electrode and the auxiliary electrode to clean the electrodes.

(56) **References Cited**
U.S. PATENT DOCUMENTS
3,776,832 A * 12/1973 Oswin et al. 240/411
3,975,271 A 8/1976 Saunier et al.
4,033,830 A 7/1977 Fletcher, III
4,224,154 A 9/1980 Steininger
4,427,772 A 1/1984 Kodera et al.
4,808,287 A * 2/1989 Hark 210/637
4,992,156 A 2/1991 Silveri

1 Claim, 6 Drawing Sheets

