



US005612050A

United States Patent [19]

[11] **Patent Number:** **5,612,050**

Rowe et al.

[45] **Date of Patent:** **Mar. 18, 1997**

[54] **APPARATUS AND METHOD FOR LOCAL APPLICATION OF POLYMERIC MATERIAL TO TISSUE**

FOREIGN PATENT DOCUMENTS

[75] Inventors: **Stephen C. Rowe**, Wellesley, Mass.; **Jeffrey A. Hubbell**, San Marino, Calif.; **Stephen J. Herman**, Andover, Mass.; **Vae Sun**, Palo Alto, Calif.; **Michael F. Lang**, North Andover, Mass.; **George E. Selecman**, Marblehead, Mass.; **Frederick F. Ahari**, Newton, Mass.

0183372 6/1986 European Pat. Off. .
WO90/01969 3/1990 WIPO .
WO91/17731 11/1991 WIPO .
WO92/21354 10/1992 WIPO .
WO93/17669 9/1993 WIPO .
WO93/16687 9/1993 WIPO .

[73] Assignee: **Focal, Inc.**, Lexington, Mass.

OTHER PUBLICATIONS

[21] Appl. No.: **476,124**

Poppas, D.P. et al., "Chromophore Enhanced Laser Welding of Canine Ureters in Vitro Using A Human Protein Solder: A Preliminary Step for Laparoscopic Tissue Welding", The Journal of Urology, vol. 150, pp. 1052-1055, Sep., 1993.
Choma, T.J., M.D. et al., "CO₂ Laser Urethroplasty in the Rabbit: A Preclinical Model", Lasers in Surgery and Medicine, vol. 12, pp. 639-644, 1992.

[22] Filed: **Jun. 7, 1995**

Klozce, S.D. et al., "Development and Initial Application of a Real Time Thermal Control System for Laser Tissue Welding", The Journal of Urology, vol. 152, pp. 744-748, Aug. 1994.

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 36,128, Mar. 23, 1993, abandoned.

Poppas, D.P. et al., "Laser Welding in Urethral Surgery: Improved Results with a Protein Solder", The Journal of Urology, vol. 139, pp. 415-417, Feb., 1988.

[51] **Int. Cl.**⁶ **A61F 2/02**; A61M 1/30; A61K 31/74

Poppas, D.P. et al., "Patch Graft Urethroplasty Using Dye Enhanced Laser Tissue Welding with a Human Protein Solder: A Preclinical Canine Model", The Journal of Urology, vol. 150, pp. 648-650, Aug. 1993.

[52] **U.S. Cl.** **424/423**; 424/78.08; 604/20

Poppas, D.P. et al., "Preparation of Human Albumin Solder for Laser Tissue Welding", Lasers in Surgery and Medicine, vol. 13, pp. 577-580, 1993.

[58] **Field of Search** 604/20; 424/423, 424/78.08

[56] **References Cited**

Primary Examiner—Carlos Azpuru
Attorney, Agent, or Firm—Wolf, Greenfield & Sacks, P.C.

U.S. PATENT DOCUMENTS

2,170,599 8/1939 Stricklen .
2,518,486 8/1950 Mende .
3,238,941 3/1966 Klein et al. .
3,415,419 12/1968 Jewett et al. .
3,675,651 7/1972 Meyer .
3,707,146 12/1972 Cook et al. .
3,880,158 4/1975 Gurney .
3,987,000 10/1976 Gleichenhagen et al. .
4,080,969 3/1978 Casey et al. .
4,118,470 10/1978 Casey et al. .
4,346,108 8/1982 Singer .
4,385,344 5/1983 Gonser .
4,588,395 5/1986 Lemelson .
4,668,226 5/1987 Omata et al. .

[57] **ABSTRACT**

An apparatus is provided for applying to a surface of mammalian tissue including soft, living tissue an initially fluent material and then activating the material by exposure to an energy source. The material may be a liquid capable of polymerization to a non-fluent state by exposure to actinic light. The device, and methods that may be practiced in association with the device, enable a wide range of medical conditions to be treated including, for example, the application of a barrier to, soft tissue to prevent post-surgical adhesions.

(List continued on next page.)

33 Claims, 13 Drawing Sheets

