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Gravenstein et al.

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- (54) **IMAGING SCOPE**
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|-----------|----------|---------------------------|---------|
| 4,846,153 | 7/1989 | Berci . | |
| 4,854,301 | 8/1989 | Nakajima . | |
| 4,862,258 | * 8/1989 | Kidawara et al. | 600/132 |
| 4,924,855 | 5/1990 | Salerno et al. . | |
| 4,943,770 | 7/1990 | Ashley-Rollman et al. . | |
| 4,980,012 | 12/1990 | Nieda et al. . | |
| 5,095,888 | * 3/1992 | Hawley | 600/194 |
| 5,125,406 | 6/1992 | Goldstone et al. . | |
| 5,127,079 | 6/1992 | Suzuki et al. . | |
| 5,131,380 | * 7/1992 | Heller et al. | 600/121 |
| 5,202,795 | 4/1993 | Kashima . | |
| 5,205,280 | * 4/1993 | Dennison, Jr. et al. | 600/112 |
| 5,257,636 | 11/1993 | White . | |
| 5,279,281 | * 1/1994 | Harvey | 600/164 |
| 5,327,881 | * 7/1994 | Greene | 600/120 |
- (List continued on next page.)

Related U.S. Application Data

- (63) Continuation-in-part of application No. PCT/US97/17954, filed on Oct. 6, 1997, which is a continuation of application No. 08/725,779, filed on Oct. 4, 1996, now Pat. No. 6,115,523.
- (51) **Int. Cl.**⁷ **A61B 1/267**
- (52) **U.S. Cl.** **600/120; 600/130; 600/143**
- (58) **Field of Search** **600/120, 130, 600/114, 143, 121, 144; 606/15**

FOREIGN PATENT DOCUMENTS

- 4132687 4/1993 (DE) .
- 9814112 4/1998 (WO) .

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(57) **ABSTRACT**

The subject invention pertains to a system for imaging the human airway having highly advantageous optical, mechanical, ergonomical and physical characteristics. In a specific embodiment, the human airway can be imaged during the intubation procedure. The subject imaging scopes can incorporate a malleable stylet which retains its shape when bent, in order to facilitate intubation of a patient. In a preferred embodiment, a solid metal stylet, for example, a conventional endotracheal tube stylet, can be utilized. In a specific embodiment the subject intubation scope allows for a user to utilize conventional techniques for the insertion of an endotracheal tube, reducing the training needed for use of the subject intubation scope. Preferably, the subject imaging scopes also incorporate at least one illumination fiber to convey light to the distal tip of the subject imaging scopes, for illumination of the objects to be imaged.

(56) **References Cited**

U.S. PATENT DOCUMENTS

- | | | | |
|------------|-----------|--------------------|---------|
| D. 410,286 | 5/1999 | Tamirisa . | |
| 3,417,746 | 12/1968 | Moore et al. . | |
| 3,776,222 | * 12/1973 | Smiddy | 600/120 |
| 3,913,568 | * 10/1975 | Carpenter | 600/120 |
| 3,941,121 | 3/1976 | Olinger et al. . | |
| 4,063,561 | 12/1977 | McKenna . | |
| 4,244,362 | 1/1981 | Anderson . | |
| 4,475,539 | 10/1984 | Konomura . | |
| 4,567,882 | 2/1986 | Heller . | |
| 4,607,622 | * 8/1986 | Fritch et al. | 600/109 |
| 4,617,915 | 10/1986 | Arakawa . | |
| 4,736,733 | 4/1988 | Adair . | |
| 4,742,819 | * 5/1988 | George | 600/120 |
| 4,782,819 | * 11/1988 | Adair | 600/136 |
| 4,800,870 | * 1/1989 | Reid, Jr. | 600/143 |

4 Claims, 7 Drawing Sheets

