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(54) **MEDICAL VENTILATOR AND METHOD OF CONTROLLING SAME**

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128/204.18; 128/924; 128/925

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See application file for complete search history.

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

3,595,226 A 7/1971 Newcombe  
4,537,190 A 8/1985 Caillot et al.  
4,565,194 A 1/1986 Weerda et al.

4,986,268 A 1/1991 Tehrani  
4,990,894 A 2/1991 Loescher et al.  
5,107,831 A 4/1992 Halpern et al.  
5,161,525 A 11/1992 Kimm et al.  
5,307,795 A 5/1994 Whitwam et al.  
5,316,009 A 5/1994 Yamada  
5,320,093 A \* 6/1994 Raemer ..... 128/203.12  
5,331,995 A 7/1994 Westfall et al.  
5,335,650 A 8/1994 Shaffer et al.  
5,339,818 A 8/1994 Baker et al.  
5,365,922 A 11/1994 Raemer  
5,402,796 A 4/1995 Packer et al.  
5,429,123 A 7/1995 Shaffer et al.  
5,546,935 A 8/1996 Champeau  
5,549,106 A 8/1996 Gruenke et al.  
5,582,163 A 12/1996 Bonassa  
5,584,291 A 12/1996 Vapola et al.  
5,598,838 A 2/1997 Servidio et al.  
5,678,539 A \* 10/1997 Schubert et al. .... 128/204.21  
5,692,497 A 12/1997 Schnitzer et al.  
5,794,615 A 8/1998 Estes  
5,884,622 A 3/1999 Younes

(Continued)

**FOREIGN PATENT DOCUMENTS**

DE 44 10 508 A1 9/1994

(Continued)

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(57) **ABSTRACT**

Embodiments of the present invention described and shown in the specification and drawings include a system and method for monitoring the ventilation support provided by a ventilator and automatically supplying a breathing gas to a patient via a breathing circuit that is in fluid communication with the lungs of the patient.

**10 Claims, 9 Drawing Sheets**

