



US005526673A

United States Patent [19]

[11] Patent Number: **5,526,673**

Avitan

[45] Date of Patent: **Jun. 18, 1996**

[54] MATERIAL HANDLING VEHICLE
CARRIAGE HEIGHT MEASUREMENT

[75] Inventor: **Isaac Avitan**, Vestal, N.Y.

[73] Assignee: **The Raymond Corporation**, Greene, N.Y.

[21] Appl. No.: **249,826**

[22] Filed: **May 26, 1994**

Related U.S. Application Data

[62] Division of Ser. No. 832,457, Feb. 7, 1992, Pat. No. 5,341,695.

[51] Int. Cl.⁶ **G01F 15/02**

[52] U.S. Cl. **73/1 J; 73/198**

[58] Field of Search **73/1 J, 3, 118.1, 73/865.8, 198; 364/424.07, 571.01-571.03; 414/529, 572, 631, 636**

[56] References Cited

U.S. PATENT DOCUMENTS

4,942,529 7/1990 Avitan et al. 364/424.01

Primary Examiner—Robert Raevis
Attorney, Agent, or Firm—Salzman & Levy

[57] ABSTRACT

The invention features a method and apparatus of determining the absolute and/or relative carriage height of a forklift truck having an extendable mast. The hydraulic fluid displacement is converted to electrical signals to obtain the carriage height. A hydraulic flow sensor has two proximity sensors to detect motion (i.e., the speed and direction) of the fluid and to provide an electrical signal. A conversion factor is applied to the signal to precisely determine the carriage height. The conversion factor compensates for the sensor asymmetrical flow and frequency characteristics, and for the fluid kinematic viscosity characteristics.

1 Claim, 5 Drawing Sheets

