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# United States Patent [19]

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Avitan

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[54] **MATERIAL HANDLING VEHICLE  
CARRIAGE HEIGHT MEASUREMENT**

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[57] **ABSTRACT**

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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.

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[51] Int. Cl.<sup>5</sup> ..... **G01F 15/02**

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

[58] Field of Search ..... **73/1 J, 3, 118.1, 865.8,  
73/198; 364/424.07, 571.01, 571.02, 571.03;  
414/529, 572, 631, 636**

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**5 Claims, 5 Drawing Sheets**

