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United States Patent [19]
Young

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- [54] METHOD FOR MEASURING THE FLOW RATE OF A COMPONENT OF A TWO-COMPONENT FLUID MIXTURE
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- [73] Assignee: Exac Corporation, San Jose, Calif.
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- [51] Int. Cl.⁵ G01F 1/74; G01N 9/00
- [52] U.S. Cl. 73/32 R; 73/861.04; 364/577
- [58] Field of Search 73/32 R, 61.43, 61.44, 73/861.04, 861.38; 364/510, 558, 577

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[57] ABSTRACT

A method for determining the relationship between the density of a multi-component fluid mixture comprising a number of known components and the concentration of one of the components of the fluid mixture. The method comprises the steps of:

- (i) determining a first and a second density-concentration relationship to define the relationship between the density of the fluid mixture and the concentration of the component at first and second known temperatures T₁ and T₂, respectively;
- (ii) measuring the temperature T of the mixture;

- (iii) determining a temperature ratio value according to the relationship

$$\frac{T - T_2}{T_1 - T_2}$$

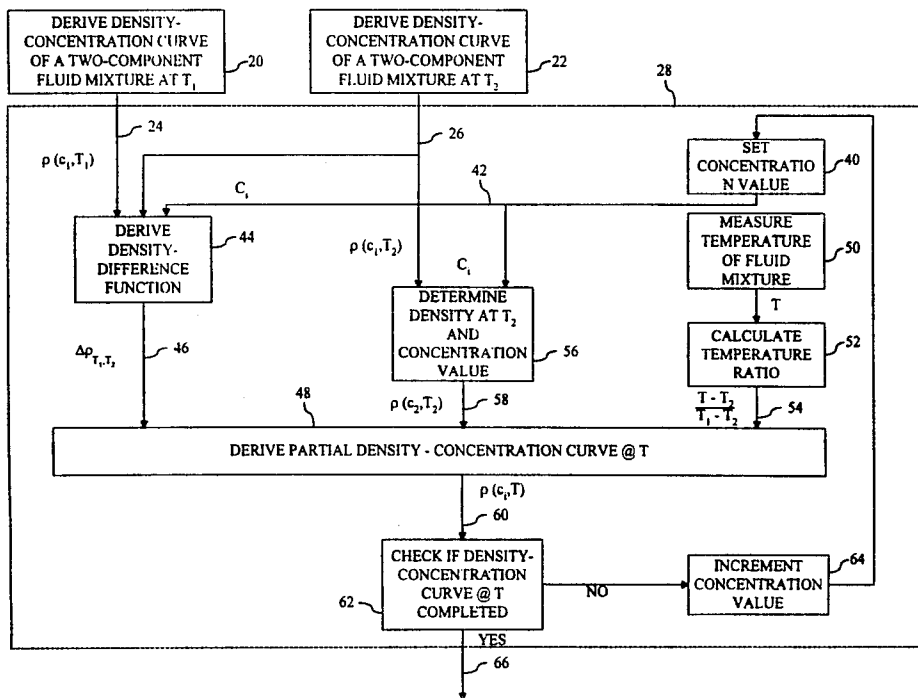
- (iv) choosing a component concentration value C_i;
- (v) determining first and second density values ρ(C_i, T₁) and ρ(C_i, T₂) by inputting the component concentration value C_i into said first and second density-concentration relationships to yield the first and second density values respectively;
- (vi) subtracting the second density value from the first density value to produce a density difference value Δρ_{T₁,T₂};
- (vii) processing the results from steps (iii), (v) and (vi) according to the equation

$$\rho(C_i, T) = \rho(C_i, T_2) + \left[\frac{T - T_2}{T_1 - T_2} \right] \cdot \Delta\rho_{T_1, T_2}$$

to produce a density-concentration value ρ(C_i, T) for said fluid mixture;

- (viii) incrementing the component concentration to provide a new component concentration value C_i;
- (ix) repeating steps (v) and (viii) until sufficient density-concentration values have been produced to define the relationship between the density of a multi-component fluid mixture comprising a number of known components and the concentration of one of the components of said fluid mixture.

6 Claims, 5 Drawing Sheets



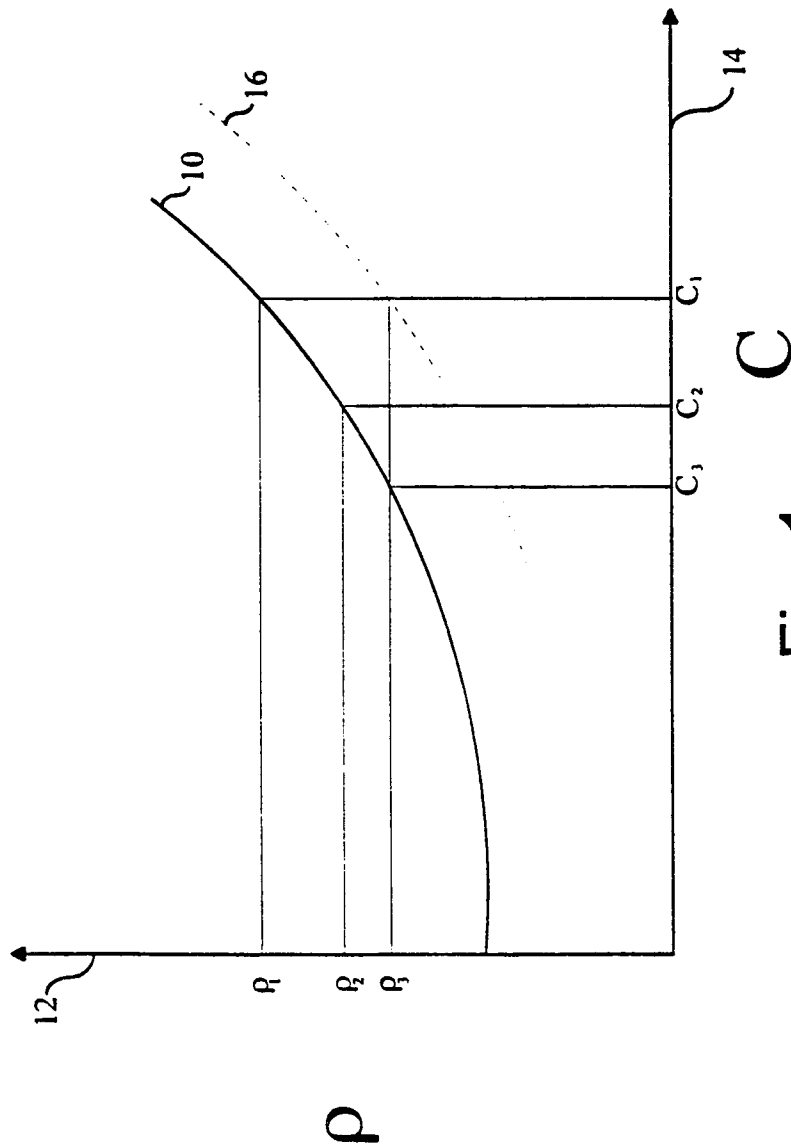


Fig. 1
(Prior Art)

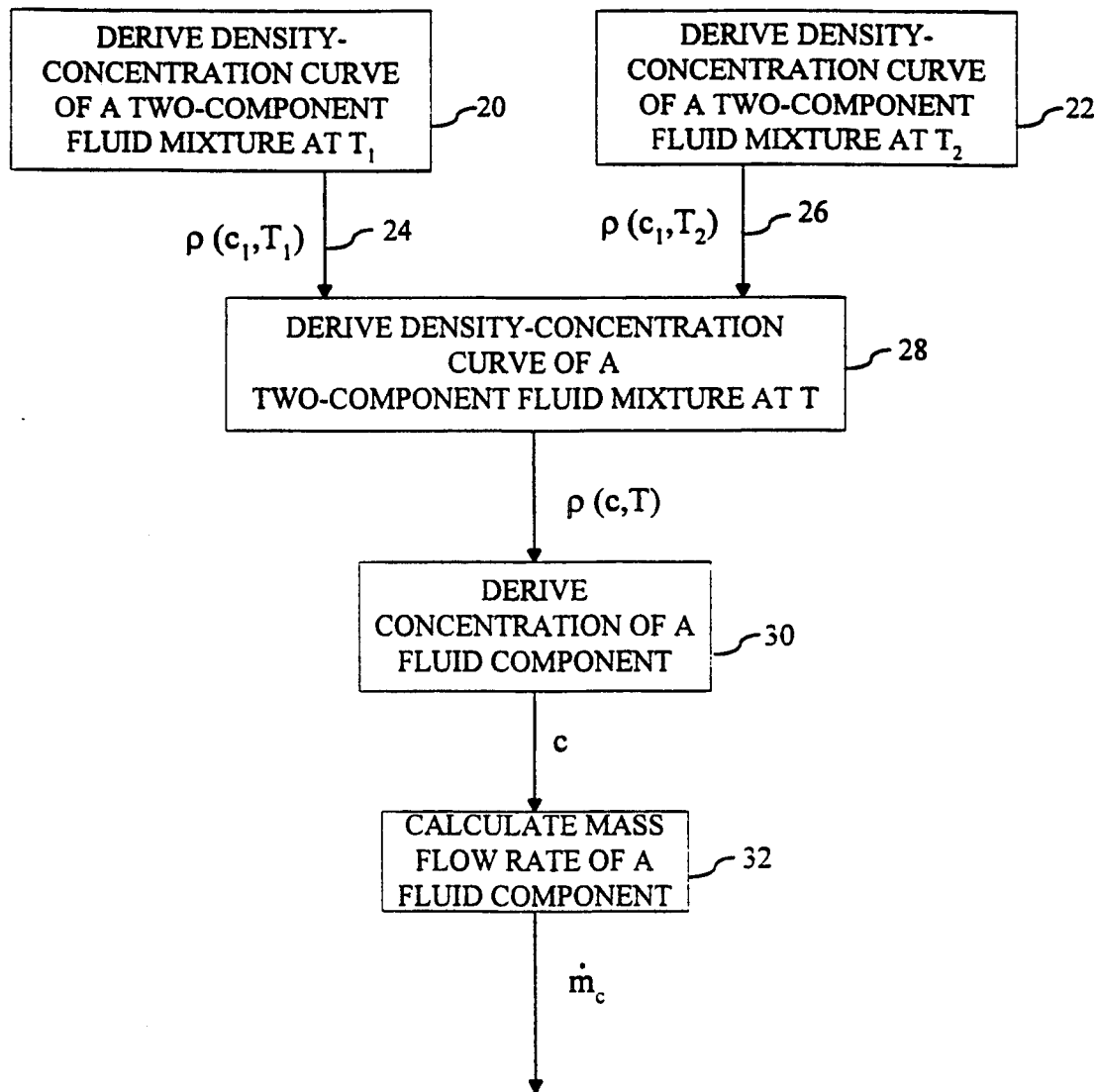


Fig. 2

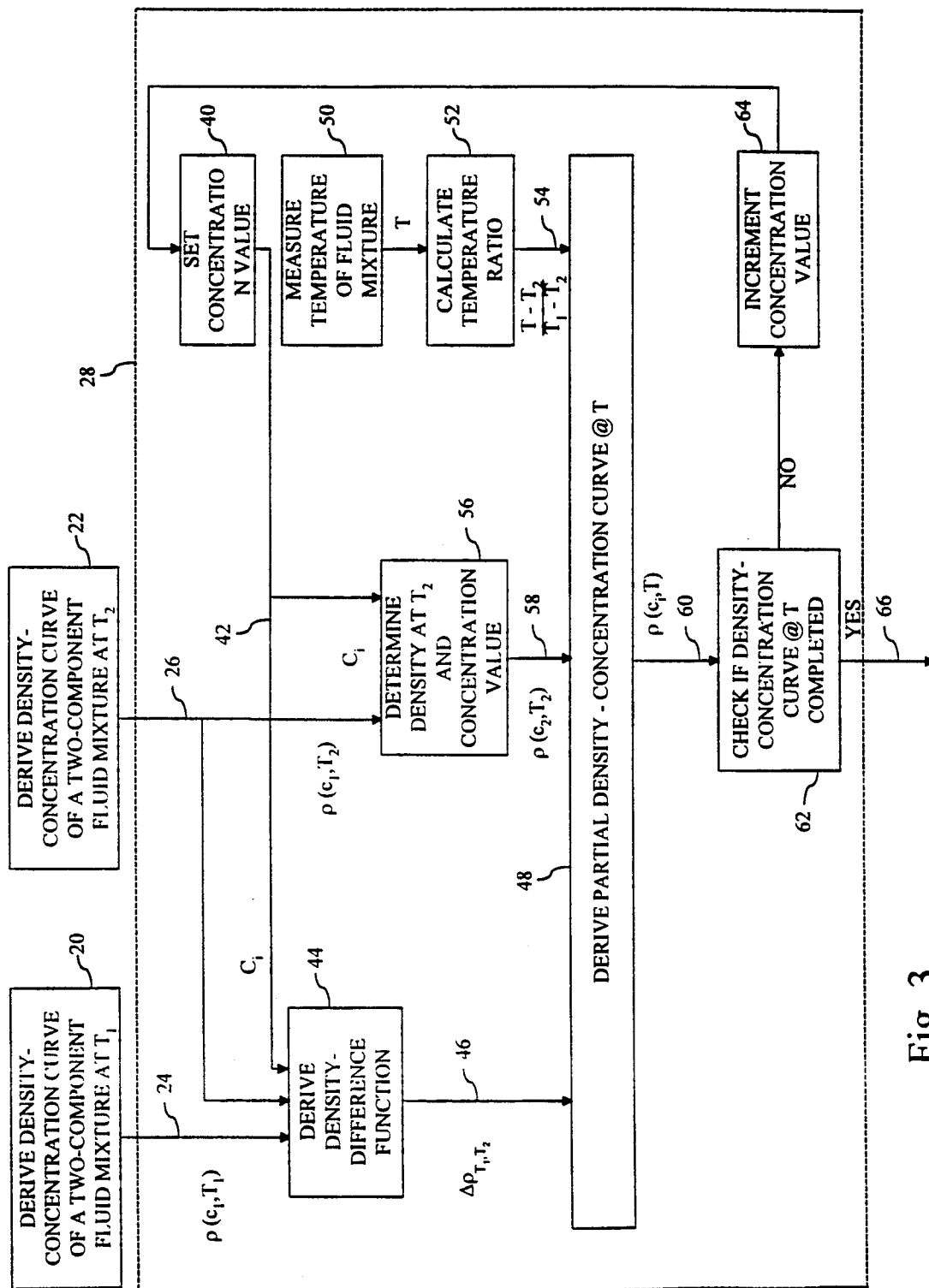


Fig. 3

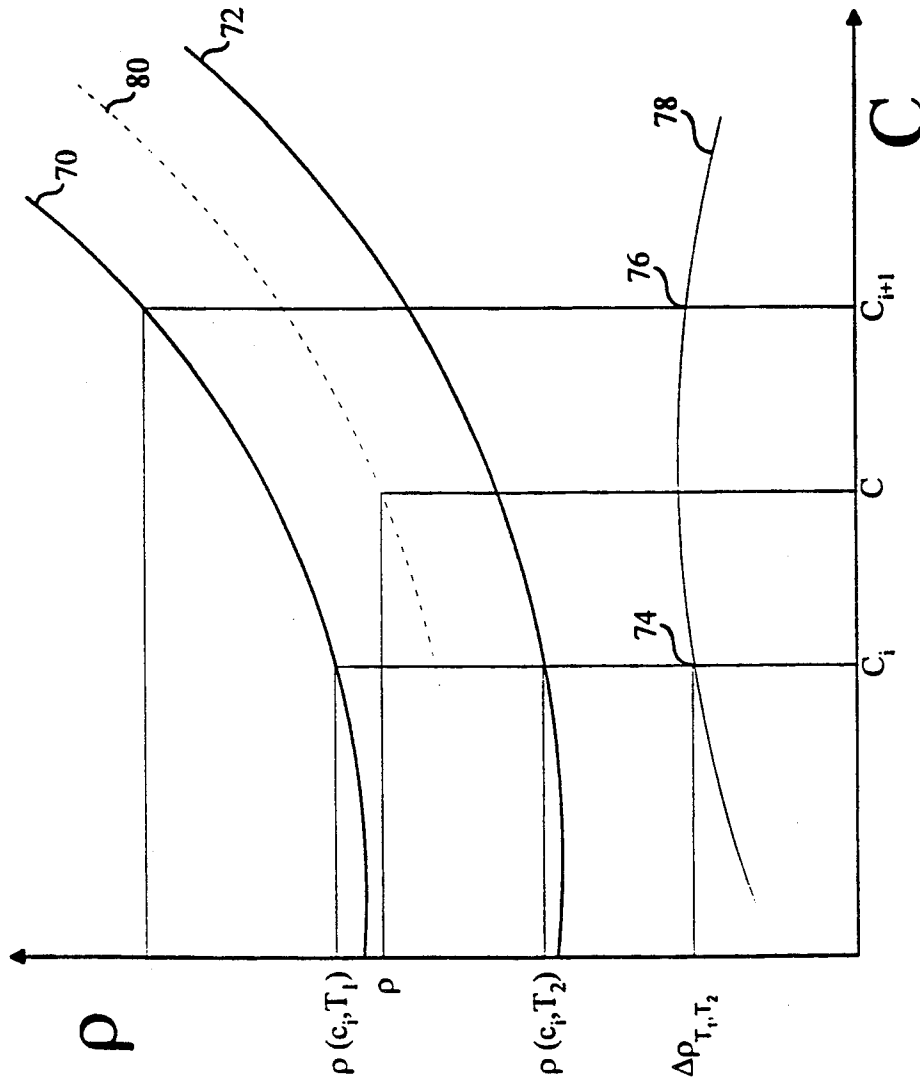


Fig. 4

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