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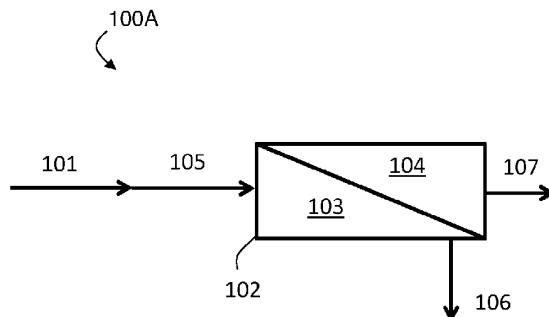


FIG. 1

(57) **Abstract:** Liquid solution separation (e.g., concentration and/or desalination) methods and related systems involving membrane separators having at least one-semipermeable membrane are provided. In some instances, at least some of the membrane separators permit a portion of solute in a retentate side input stream to pass through the semi-permeable membrane. In some instances, multiple membrane separators are employed, with the membrane separators having different solute permeabilities (e.g., due to varying pore size and/or molecular weight cutoffs). The methods and systems may be configured such that the ratio of mass flow and/or concentration of solute entering the retentate sides of the membrane separators are relatively high compared to the mass flow and/or concentration of solute exiting the retentate sides of the membrane separators. Such ratios may be relatively high for some or all membrane separators employed, which can in some instances reduce capital and/or operational expenditures for the liquid separation processes.

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